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THE PSYCHODYNAMICS OF SMALL GROUPS

by

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University of Illinois.

Final Report on Research Project NR 172-369, Contract N80nr-79600

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Entitled:

RESEARCH ON THE PSYCHODYNAMICS OF GROUPS UNDER  
CONTROL CONDITIONS: PRINCIPALLY DIRECTED TO DISCOVER  
OBJECTIVELY MEASURABLE INDEPENDENT DIMENSIONS OF GROUP  
MORALE AND PERFORMANCE.

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## INTRODUCTION

Project N80nr, 79600 was a three year project, beginning December 1948 but extended for part of a fourth year, ending September 1952. It was supported to the amount of \$1200.00 during the first year; \$8500.00 during the second and \$11,436.68 during the third. It has been directed by Research Professor R. B. Cattell of the Laboratory of Personality Assessment and Group Behavior, University of Illinois. The chief co-workers have been Dr. Glen Stice, Dr. D. R. Saunders, Dr. C. A. Gibb, Mr. E. Haverland, Mr. T. Meeland, and Mr. A. Miller, but due to the inadequacy of the funds to the scale on which this research design had necessarily to be carried out, some students doing degree thesis and various half time student assistants also gave considerable time. In particular Dr. L. Wispe is to be thanked for original contributions to the design of the test situations.

In the difficult task of obtaining as many subjects as were necessary the research is much indebted to Dr. Howard Page and Dr. J. MacMillan for introduction to sources, to the Human Resources Research Center, Lackland Air Base, Texas for supplying 410 cases, to Colonel Barton of the Officer Candidate School and to Captain K. L. Nutting of the Great Lakes Naval Training Center for supplying 200 subjects and to colleagues at the University of Illinois for arranging the help of 500 students as subjects.

Two articles have gone to press on the research (in addition to two articles on the theoretical basis and a chapter in the ONR book, Groups, Leadership and Men, Edited by H. Guetzkow). These are:

1. Methodology and Findings on the Dimensions of Syntality in Small Groups. 1. Neonate Groups.
2. Methodology and Findings on Syntality. 2. Neonate Groups with a Leader.

Cattell and Stice are also preparing a small book integrating this and related work under the title: "The Behavior of Small Groups: An experimental study of morale, leadership and group characteristics".

## CHAPTER I

### The Theoretical and Methodological Basis of the Research

Quantitative and exact research on group behavior, directed to establishing laws and regularities, deals essentially with relationships among (a) the qualities of groups and (b) the qualities of individuals, e.g. the effect of individuals upon groups, groups upon individuals, individuals upon individuals, and of groups upon groups. An enormous amount of work directed to measuring the individual has produced tolerable measuring instruments and some workable hypotheses about what structures it is important to measure in the individual personality (2) (3) (6). On the other hand, scarcely any information exists regarding the characteristics which are so important to measure with respect to groups. Such terms as morale, aggressiveness, degree of unity, dictatorship of leadership, degree of interaction or "we-feeling", etc. are used, but nothing is known about how dependent these are in regard to one another or what real functional unities exist there to be defined. Accordingly, the primary object of this research has been to determine the dimensions of groups, in terms of behavioral performances and of internal structure. This objective, however, permitted us fine opportunities to throw light also on other matters, from the same data, so that we have reached some reliable findings also in regard to the qualities of leaders, the relation of leadership processes to the character of the group, the phenomena of group learning, and the laws regarding the shifts of attitudes and interests within groups.

The research has been pursued within a theoretical framework which had in part already been set out in earlier articles (5) (6), while a pilot study, by Cattell and Wisse (9) had explored the methodology of determining the dimensions of groups, by working on some 40 performances with 21 groups of six people each. It was apparently on the basis of these initial clarifications of theory and demonstrations of method that the Research Board felt justified in encouraging the larger study to proceed. Theoretically the chief concepts are those of three panels of group description (1) population, "mean characteristics", (2) structural characteristics, and (3) syntality characteristics. The latter is defined analogously to personality as "that which predicts what the performance of the total group will be in a defined stimulus situation". It is supposed that syntality will have a number of important primary dimensions just as personality can be resolved into a number of primary personality factors. Methodologically, it is argued that the soundest way to discover these dimensions is to allow groups to perform in a great variety of situations, to intercorrelate the performances and to factorize them, just as has been done with personality and ability factors, thereby obtaining (a) a relatively small number of measures which can be used economically in all further researches and (b) some information about the structure, since the factor patterns which are obtained will presumably correspond to functional unities in organization.

A second concept used here is that of synergy. This is the total interest-energy which goes into the life of a group. It is supposed that, using the ergic theory of attitude measurement, the interest of any one individual in his group can be measured as a vector quantity, the length of which expresses the strength of his interests and the direction of which, in relation to the coordinates of basic drives, indicates the quality of the satisfaction which he obtains through the group. A group is defined as "an aggregate of people in which the existence of all is utilized for the satisfaction of some needs of each". This defines a group therefore as a problem solving instrument, invented by individuals to obtain ends which they could not so well obtain on their own. The vector sum of the attitude of the component individuals in a group will give the total interest which the group can command, and this is called the synergy. It is of interest in the dynamics of groups to analyze this synergy, both as to (1) its ergic qualities (2) the stimulus situations within the

group which provoke it (3) the uses to which it is put. In connection with the last the distinction is made between maintenance synergy i.e., the energy required for the mere maintenance of the group, and effective synergy i.e., the energy which goes into purposes for which the group was brought into existence. These concepts will become clearer as the experiment and its results are explained.

A third aspect of the theory developed here concerns the definition of leadership. We have defined the measurement of leadership as the measurement of syntality change, relative to the average leader, produced by the given leader. That is to say, we propose to measure the goodness of leadership in terms of what that leader produced, for example, in morale, or in problem-solving capacity in groups to which he is attached. This approach also involves discovering the leader i.e., the true leader rather than the one formally in that position, by discovering which individual in the group causes the maximum change in performance. In our present study this has only a theoretical application, in that we did not set up the design to work out the distribution of changes, being more concerned with first discovering the fundamental dimensions of syntality itself whereby changes might be measured. Our definition of leadership, like that of group learning, involves, furthermore, two concepts (1) means-end leadership in which the individual advances the group to an agreed goal and (2) dynamic leadership in which there is an effect upon the group in terms of its goal objectives. This latter is measured by changes in group synergy.

It will thus be seen that we approached our research with limited hypotheses, and precise methods rather than with extensive theories. It is our belief that the more extensive theories can only arise when regularities have been found in the material in the light of these operational hypotheses and under more developed methods. It is true, on the other hand, that almost innumerable theories are implicit in our procedures as we go forward. These are all too tentative to be set out in detail here, however, we might mention the general theory that in the early stages of group formation the personality characteristics of the individuals will have a greater effect upon syntality than in later stages. We hypothesize also that the leader will be the temporary solver of immediate and specific problems in the early stages of group existence, whereas later investments of trust will cause a particular person to be retained regardless of his immediate problem solving capacity. Again, we believe that a dimension group morale will be closely tied up (negatively) with the average general neuroticism of the individual members, i.e., a population measure. Measures of the resistance of a group to dispersion should correlate strongly with measures of the total group synergy, and so on. However, our main objective is to look for lawful regularity in certain relationships which are stated as we proceed.

## CHAPTER II

### Description of the Research Design

#### 1. The Variables Used.

Our main object, as stated above, was to determine the dimensions by which newly-formed, face to face groups of about 10 people can be measured. Surveys have shown that the commonest groups in everyday life are somewhat smaller than this, but having regard to the purposes of the armed forces we thought a group of 10 would be nearer to that commonly found, for example, in gun crews, small ship crews, and especially in the crews of bombers (the crew of the B-29 having eleven people). Having settled on a group of 10 men as our defined group for investigation we next considered the type of structure which we would regard as typical of the species. Since we could at most have experimental control of the group only for a short time (9 hours), we decided to watch the groups from their inception i.e., to deal with what might be called "neonate groups". It is likely that the dimensions and qualities of groups of greater duration and with specific traditions will be somewhat different from these, but for the greatest generalizability of our findings we thought it best to start with a group of strangers brought together by common needs and to measure them at various stages of emergence of structure. This is also the type of group which predominates in current experimental work. The development of the neonate group was categorized finally by having three distinct sections, in the first of which no formal leadership whatever was planned, in the second a leader of defined powers was elected, and in the third the same leader was retained with experience of a previous session.

To be consistent with our definition of a group as a set of people brought together by capacity to solve each other's needs we set up a prize of one hundred dollars for "the best group performance among each set of ten groups." This reward could be obtained only through the group. Many previous researches, we feel, have worked with groups which are groups in name only, being merely a set of individuals who are individually concerned to please some outside person, such as the class teacher, who is performing the experiment. We took precautions, incidentally, to bring together individuals who would not have previous experience with one another but who clearly understood that their individual satisfactions were to be achieved only through performance of the group as such. It is recognized, of course, that such a collection of individuals does bring group habits with it, namely the group habits of the young American male within our own culture pattern, bearing the expectations of individual interaction and leadership which he typically has. Except for this potential influence of the culture pattern the groups were initially unstructured.

It is next necessary to describe the performance and structural variables on which the groups were measured. In regard to both syntality and structural variables our aim was to be as catholic as possible, sampling a great variety of group behavior and including with special emphasis only such specific kinds of behavior as have relation to some of our existing hypotheses about the dimensions of groups. Thus the syntality measures i.e., the measures of the total group performance, were designed to include mechanical construction work; committee-like procedures requiring decisions based on inadequate data; the unravelling of a problem, namely by "breaking" a code; the reaction to panic-producing situations as produced by severe electric shock in a rope pulling experiment; arriving at group decisions as to what line of action the group should take in regard to satisfaction of interests; the honesty of the group in dealing with other groups in competition and so on. In the choice of these variables we were guided partly by the previous experience of Cattell and Wispe (9). These variables are

set out in Table 7 in Chapter 3 which is devoted wholly to describing the test situations, the ratings by observers and the test sociometric measures. From these emerge a single "Master List of Variables" defining the actual scores used in all three matrices i.e. all three sessions. An introduction defines the numbering of the identification system as it refers to various group centered (syntality) matrices in which the variables are used. The chapter also contains five tables breaking down the total variables into (1) a group performance list (2) an observed rating list (3) an observed interaction variable list, (4) a sociometric scores list and (5) a personality factor list. It will be noted that the list of variables is not the same as the list of experimental situations since more than one variable could sometimes be measured from one and the same experimental situation. However, in deriving two or three measures from one experimental situation we have been careful as far as possible to avoid spurious correlations through using a numer-

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For purposes of arriving at the most meaningful way of scoring certain variables we did try the same measures computed in a number of different ways and entered these into a single matrix. For example, in the session 3 matrix variable K6 is a measure of a speed of card sorting. It consists of the number of stacks right, divided by the time taken. K7 is a measure of accuracy and consists simply of the number of stacks right. In that same matrix, I notice that E1 and O8 are both made of sociometric rejection measurements. In the one case the measure is the mean number of people rejected in the group and in the other case it is that of social centers for rejection, i.e., the number of members that received six or more rejections.

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ical value in one as a denominator in another and so on. The only spurious correlation left to arise in such circumstances is the slight one due to correlated error.

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In the field of group structural or individual interactional variables our sources of data were two-fold. First there were certain observations made by the experimenter upon the group as a whole e.g. the degree of leadership exercised, the degree of "we-feeling" experienced and so on (Table 4). Secondly there were certain interactional (sociometric) variables describing the reactions of the individual members of the group (Tables 3 and 5). Since we believe that social structure as such has to be an inferred pattern from observations on the behavior of individuals the first of these modes of observation is to be considered only as a rough, but convenient approach to what is properly derived from the second only. The social structure variables, both those observed directly and those through the interaction of individuals are listed in Chapter 3, as indicated in Tables 4 and Tables 3 and 5 respectively. The scores derived from group members in Tables 3 and 5 represent respectively "sociometric" variables and variables derived from counts on the interaction of individuals. The term sociometric is used here in what we consider a more coherent sense than Moreno's restricted usage, to comprehend any scores based on reports by one group member about another i.e. not only whether he considers him an acquaintance, but whether he approves or disapproves, communicates with confidence or not, and so on through a gamut of possible evaluative self-conscious assessments.

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In regard to the population variables we were fortunately able to depend upon the recent comprehensive work on primary personality factors and obtain through a single concise measure, namely the 16 Personality Factor Questionnaire

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Published by the Institute for Personality and Ability Testing, 1608 Coronado Drive, Champaign, Illinois. 6a in references

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a measure of such primary factors as emotional stability, intelligence, dominance, cyclothymeschizothyme temperament, surgency-desurgency, etc. These are set out in Table 2 in Chapter 3. In the cooperative atmosphere of these experiments it seemed justifiable to use a questionnaire rather than an objective test. The questionnaire results on actual personality were supplemented also by a questionnaire concerning background experiences of the individuals in these groups.

## 2. The Population and Statistical Analysis

Having described the design as it concerned the nature of the group and the nature of the measurements made upon the groups we must now turn to the design of experiment as it concerns the statistical analysis ultimately proposed. From the pilot study it would appear that we might expect anything from six to a dozen factors to emerge from our factorization. The number of variables which we have defined above (18 population; 24 sociometric; 17 observes and 34 group performance measures i.e. 93 in all) is easily large enough to give definition and substance to as many as a dozen or fifteen factors and our concern for statistical reliability and clarity is therefore more involved with the question of the number of groups than the question of the number of variables.

As to population, the experimental work on individuals e.g. that of Thurstone and of the senior author here, shows that about a hundred to a hundred and fifty persons is normally enough to give standard errors of factor loading such as to permit one to define about a dozen factors. The preliminary pilot study on groups, correlating performances for only 21 groups, was largely an academic exercise to demonstrate the method, for such a population of groups is decidedly too few. On the other hand to get a hundred and fifty groups would be an enormous undertaking and we decided to compromise by aiming at about a hundred.

It must be said at once that the gathering of one hundred groups of ten men each, at least 10 hours being required from each of the individuals in those groups, proved the most onerous and difficult part of our undertaking, in view of our limited resources. The absence of one man from one group session could vitiate all measures for that group. We are proud enough of having overcome a series of almost insuperable obstacles here to ask whether so much testing time of so many people has ever been obtained at comparable expenditure of research funds. Our inquiries went in all directions, to universities, to officers' training groups in the various armed forces, to business concerns etc., but it was largely through the kindness of the Human Resources Research Center at Lackland Air Base and the military officers connected with the Officer Candidate School there, as well as the cooperation of the Great Lakes Naval Training Station, which finally permitted us to gain our objective. It is a pleasure to acknowledge at the end of this report our debt to the actual individuals who were concerned in opening up these channels to us. We wish also to thank the fraternities and other student groups of the University of Illinois. A good deal of these administrative arrangements were in the hands of Dr. C. A. Gibb and especially Dr. Glen Stice, and it is a tribute to the administrative talent of all concerned, and to the tireless fortitude of the latter that he did not stop until more than one hundred groups had been collected. However, it must be recognized that there are special hazards in group work rising from the fact mentioned above that if one member of the group absents himself for one session the group cannot be called the same on all three sessions. Furthermore, the chances of one man out of ten absenting himself through illness or similar causes are considerable. If we reject those groups from which two or more men were absent for one or more sessions we find we are left with only 80 effective groups and it is on these eighty groups that the main calculations below have been worked out.

### 3. Plan of the Factor Analytic Treatment

Our plan to discover the functional relationships of variables rested on the statistical analyses of the intercorrelations of the syntality variables, the social structure variables, and the population variables in a single pool. An alternative would have been to correlate them in three separate pools -- syntality, internal structure, population measures. We believe that this specialized approach should be made at a later stage of research, but that in the initial exploratory study such as this one it is of interest to know how population, structure and syntality characteristics are interrelated, even though this breadth of manifestation may result in some loss of definition in factors relative to that which would have been obtained had we kept to a single panel. On the other hand, it does not seem desirable to intercorrelate the measures upon the same group made at three different stages in its existence. Accordingly our statistical breakdown takes the variables only for the first session, and intercorrelates and factorizes those in a single study. It then replicates this for the second and third sessions, investigating the changes of pattern with the continued life of the group. Only when this has been done do we set out to intercorrelate (in a later monograph) all the phases in the groups existence. It is necessary to mention this analysis in the present section dealing with research design because the three phase analysis had to be met by an experimental plan distributing performance variables over the three phases in a way which would meet certain experimental and statistical requirements. Briefly our aim was to include any one variable in at least two group sessions so that the cross reference later to be made on the factor structure permits this to be used as a "marker variable" over the two sessions. This was done with as many variables as was compatible with not making any one of the experimental sessions too long. It thus insured that with respect to all three sessions any one group would have all the variables measured once and most of them twice. The design of overlap is shown in Table 1.

Apart from this main consideration the particular order of the variables in the three matrices was determined by practical consideration. Thus the session 1 matrix which was developed first contained for the most part the most readily computed variables. Session 2 which was done last, contained the most involved variables, for example, the sociometric ratings and the observer ratings in session 1 are taken from the discussion situation where the instructions were to base the ratings on a total session. This was done in order to simplify computation so that the scores could be obtained in a hurry and put into the matrix without waiting too long. On the other hand in the session 2 matrix which was done last and for the most part in the session 3 matrix rather than take the overall ratings we took the ratings in every situation where they had been obtained in the session except in the case of sociometric and observer ratings we did not use the dynamometer or card sorting situations at all because only 50% of our groups had done these ratings. A second point is that certain variables which we tried in the first session matrix were dropped in later ones because they had very high intercorrelations and their pattern of correlations with other variables in the matrix was very similar. This is particularly true of sociometric variables.



TABLE 1

|                                      |     | Session 1                 | Session 2 | Session 3 |
|--------------------------------------|-----|---------------------------|-----------|-----------|
| <u>Population Measurements</u>       |     |                           |           |           |
| 001-018 (18)                         |     | The same for all sessions |           |           |
| <u>Sociometric Scores</u>            |     | X                         | X         | X         |
| 101-126 (22)                         |     |                           |           |           |
| <u>Observer Ratings on Structure</u> |     | X                         | X         | X         |
| 201-251 (17)                         |     |                           |           |           |
| <u>Performance Variables</u>         |     |                           |           |           |
| 300-402 (57)                         |     |                           |           |           |
| Construction:                        |     |                           |           |           |
|                                      | 300 |                           |           |           |
|                                      | 301 | X                         | X         | X         |
|                                      | 302 |                           |           |           |
| Group Judgment                       |     |                           |           |           |
|                                      | 310 | X                         | X         |           |
|                                      | 311 |                           |           |           |
| Attitudes                            | 320 | X                         | X         |           |
| Guessing                             | 330 | X                         |           |           |
| Game                                 | 331 |                           |           | X         |
|                                      | 332 |                           |           |           |
| Dynamometer                          | 340 | X                         | X         | X         |
| Pull                                 | 341 |                           |           |           |
|                                      | 342 |                           |           |           |
|                                      | 343 |                           |           |           |
|                                      | 344 |                           |           |           |
| Interests                            | 350 | X                         |           | X         |
|                                      | 351 |                           |           |           |
|                                      | 352 |                           |           |           |
|                                      | 353 |                           |           |           |
| Card Sorting                         | 360 | X                         |           | X         |
|                                      | 361 |                           |           |           |
| Preferences                          | 370 | X                         | X         |           |
|                                      | 371 |                           |           |           |
| Jury                                 | 380 |                           | X         | X         |
| Judgments                            | 381 |                           |           |           |
|                                      | 382 |                           |           |           |
|                                      | 385 |                           |           |           |
|                                      | 390 |                           |           |           |
| Honesty                              | 391 |                           | X         | X         |
|                                      | 392 |                           |           |           |

TABLE 1 (Continued)

|            |     | Session 1    | Session 2    | Session 3    |
|------------|-----|--------------|--------------|--------------|
| Cryptogram | 400 |              | X            | X            |
| Solution   | 401 |              |              |              |
|            | 402 |              |              |              |
| Leadership | 411 |              |              |              |
| Selection  | 412 |              |              |              |
|            | 413 |              |              |              |
|            |     | 8 tests      | 8 tests      | 8 tests      |
|            |     | 32 Variables | 22 Variables | 26 Variables |
|            |     | 43           | 43           | 43           |

As to the use of the factor analytic method in this research design it should be understood that we mean not a mere mathematical application of the method, but a flexible use of it in regard to psychological meaning to be obtained through the objective process of rotation for simple structure. Whether such a simple structure could be found remained to be demonstrated by the experimental results. The separate rotation of the three factorizations proposed should show, by the degree of agreement among them, to what extent this is a real simple structure. Having obtained the factors, and measured the dimensions of the individual groups upon them, our design envisaged further analysis in the direction of (1) comparing each of the three sessions of the groups to see which factors altered, and (2) the extensive relating of the factor measures of the groups to the measures of the individuals composing the groups, the leader characteristics and other matters of that kind. These will be set out in the statistical analysis below.

#### 4. Procedure

Although the procedures of experiment have been implied at various points it would be best to recapitulate here.

First the group was assembled and asked if everyone was willing to go through the ten hours of experiment. The reward system was explained and the individual testing was completed by each person sitting down for an hour or more on the questionnaire.

At the first group session, which followed in one to three days, the subjects were given colored arm bands and told how to refer to each other in conversation. They were told the experimenter would describe each problem in turn and retire to a raised position at the end of the room where he would be beyond consultation. The subjects sat in a circle of chairs with "desk arms", at one end of a large, well-lit room. The experimenter and his fellow observer were dressed in white coats to distinguish them from the subjects. They stood outside the circle and while the test was in progress took care to dissociate themselves by retiring conspicuously from the group. Both made their notes immediately, as the experiment proceeded and the experimenter walked back into the group when time was up and interrupted the activity.

The procedures of individual experiments are described in Table I. Before each experiment and after instructions had been orally given, the subjects have encouraged to ask any questions needed to clarify the tests before it commenced.

The second and third sessions, each also requiring about three hours, were generally in the same week, but in a few cases of illness etc. were postponed over two or three weeks.

The groups were strongly cautioned against talking to other groups of their experiences and it was pointed out that such "leakage" would only result in their having a poorer chance for the \$100.00 prize.

Observations on individual interaction, on the Interaction Analysis Blank (see below) were initially made with the help of a wire recorder and a stenographer; but later it was found best to train observers to make check marks directly on the Blank (opposite the color designation of each man) as interaction occurred.

## CHAPTER III

### Systematic Listing of Variables

In order to simplify reference to the different scores which were used in the three syntality matrices, the descriptive titles for the various variables are set out in Tables 2 to 6, while Table 7, the "Master List" -- sets out a complete description of each variable and of its statistical treatment, together with the identification numbers showing where it is located among the three matrices.

The individual "population" measurements, made upon group members outside of the group situation are shown in Table 2. These consist of (a) scores on the 16 Personality Factor Test (6a), (b) responses to attitude statements and (c) expressions of relative preference to a number of hypothetical group situations.

Table 2.

Individual Population Measurements:  
Personality, Attitude, Interest.

|     |   |
|-----|---|
| 001 | Friendly cyclothymia v. Taciturn, Schizothymia. (A)                   |
| 002 | General Intelligence (B)  |
| 003 | Emotional maturity v. General Neuroticism (C)                         |
| 004 | Dominance (E)   |
| 005 | Surgency v. Desurgency (F)  |
| 006 | Positive Character integration (G)                                    |
| 007 | Adventurous cyclothymia v. self-conscious, withdrawn schizothymia (H) |
| 008 | Tenderminded sensitivity v. Hard-headed practicality (I)              |
| 009 | Paranoid suspiciousness v. Lack of this (L)                           |
| 010 | Bohemian hysteric aggressiveness v. Practical concernedness (M)       |
| 011 | Polished fastidiousness v. Rough simplicity (N)                       |
| 012 | Worrying suspicious anxiety v. Calm trustfulness (O)                  |
| 013 | Radicalism v. Conservatism (Q <sub>1</sub> )                          |
| 014 | Independent self-sufficiency v. Lack of resolution (Q <sub>2</sub> )  |
| 015 | Deliberate will-control v. Lack of independence (Q <sub>3</sub> )     |
| 016 | Nervous tension (Q <sub>4</sub> )                                     |
| 050 | Attitude change following discussion                                  |
| 062 | Interests, distribution of individual investments.                    |

The sociometric variable list consists of responses made by the group members about one another at the completion of each group situation. These responses are of three general kinds; (1) choices of other group members with regard to a defined criterion; (2) evaluations of the group structure or performance (3) description of affective reactions of the respondent to the group and group members.

Table 3

The Sociometric Variable List

|     |   |
|-----|---|
| 100 | Sociotelic selection (limited number choices)   |
| 101 | Sociotelic selection (unlimited number choices) |
| 102 | Sociotelic rejection (unlimited number choices) |
| 103 | Number of clear speakers                        |

|     |   |
|-----|---|
| 107 | Number of negative effectors                      |
| 108 | Number of significant members                     |
| 109 | Psychotelic selection                             |
| 110 | Psychotelic rejection                             |
| 111 | Selection as friend                               |
| 112 | Members judged to have shown leadership           |
| 114 | Extent of influence of formal leader              |
| 115 | Helpfulness of leader                             |
| 116 | Extent of satisfaction with leaders performance   |
| 117 | Rated enjoyment                                   |
| 118 | Rated freedom to participate in the group process |
| 119 | Extent number felt he was accepted by group       |
| 120 | Feeling about session                             |
| 121 | Rated importance of experience                    |
| 122 | Optimism for the group future                     |
| 124 | Rated commonness of purpose                       |
| 125 | Rated extent of unitariness                       |
| 126 | Satisfaction with overall efficiency              |
| 127 | Rated excellence of group decisions               |
| 129 | Rated morale of the group                         |
| 131 | Satisfaction with conformity to the rules         |

The observer rating list is the list of syntality and interactional (structural) features with regard to which each observer independently rated the groups at the end of each situation.

Table 4

Observers' Rating List (Ratings of Group Structural Data)

|     |  |
|-----|--|
| 201 | Group organization   |
| 202 | Leadership technique   |
| 203 | Degree of leadership   |
| 204 | Orderliness of procedure                                       |
| 205 | Freedom of group atmosphere                                    |
| 206 | Degree of we-feeling   |
| 207 | Degree of frustration  |
| 208 | Degree of interdependence                                      |
| 209 | Motivation level   |
| 210 | Tension-energy level   |
| 211 | Amount of interpersonal conflict                               |
| 212 | Extent group activity was directed toward the situational goal |
| 213 | Explicit concern with procedure                                |
| 250 | Assessment of leadership                                       |
| 251 | Assessment of "principle leaders"                              |

The observer interaction list consists of the titles to the categories which the observers used in classifying verbal discussion among members which took place in the course of the situations. Since we wished to classify each communication in each category for which it could be observed to have implications, a simple count of remarks was kept in addition to classified interaction tabulations. The form used and instruction manual for filling it out are shown in appendix IC.

Table 5

Observers' Interaction Classification List

|     |  |
|-----|--|
| 260 | Count of verbal participations                 |
| 261 | Participations classified according to content |
|     | Category 1. Encourages, congratulates          |
|     | " 2. Relaxes tensions                          |
|     | " 3. Agrees, approves                          |
|     | " 4. Leads by suggestion                       |
|     | " 5. States wishes                             |
|     | " 6. Gives information, techniques             |
|     | " 7. Asks information                          |
|     | " 8. Asks others' wishes                       |
|     | " 9. Asks guidance                             |
|     | " 10. Critic, disapproves                      |
|     | " 11. Shows egoism                             |
|     | " 12. Leads by command                         |
|     | " 13. Clarifies common objectives              |
|     | " 14. Receives acceptance                      |
|     | " 15. Receives rejection                       |
|     | " 16. Rejects group                            |
|     | " 17. Cherishes group concept                  |
|     | " 18. Constructively criticizes and exhorts    |
|     | " 19. Attacks group environment                |
|     | " 20. Neglects group                           |

The group problems and associated variables i.e. the list of group performances, is initially given in Table 6. It includes a brief description of each situation together with the measurements that were made in it. A more complete description of the situation and of the materials used is given in Appendix 1A.

Table 6.

Group Problem Situations and Associated Measurements

Situation 30: Construction.

Problem: To reproduce a building shown them in a drawing, using dowel sticks and connectors. This was to be done as rapidly as possible.  
(I, II, III)\*

- 300. Mean time required to complete a unit of work.
- 301. Time used to discuss a procedure and report a level of aspiration estimate.
- 302. Level of aspiration estimate reported.

Situation 31: Group Judgment.

Problem: To decide upon and report an accurate answer to a factual question in less than two minutes. (I, II)

310. Accuracy of answer.

311. Time spent in reaching decision and reporting answer.

Situation 32: Attitude Discussion.

Problem: To conduct 4 minute discussions of a series of statements. (I, II)

320. Group vote, in a 7 point scale with regard to the validity of the statement.

Situation 33: Guessing Game.

Problem: To discover, as rapidly as possible, by asking questions a specific object of which the Experimenter was thinking. (I, III)

330. Number of successes.

331. Number of questions asked.

332. Time taken to question the experimenter.

Situation 34: Dynamometer pull:

Problem: By dividing the group into two parts, to attain the maximum possible pull upon a dynamometer inserted between two short lengths of gas pipe. This was to be done first to reach a momentary peak and second to maintain for 20 seconds the highest possible minimum pull. In session II and III, the "minimum pull" was repeated with the gas pipes electrified to give each participant rather severe and irregular shocks. (I, II, III)

\*The Roman numerals indicate in which of the three successive sessions the given problem was used.

- 340. Level of maximum pull reached by the group.
- 341. Minimum level of pull maintained by the group.
- 342. Minimum level of pull maintained while receiving shock.
- 343. Aspiration level reported when no shock was being administered.
- 344. Aspiration level reported when shock was to be administered.

**Situation 35: Interests.**

**Problem:** To discuss a number of ways the group might be called upon to spend a 3 hour meeting, to rank these in order of preference and to indicate strength of preference as well as rank. (I, III)

- 350. Time required to rank eleven alternatives.
- 351. Time required to decide upon strength of preference.
- 352. Strength of the various preferences.
- 353. Rank of the various preferences.

**Situation 36: Card Sorting.**

**Problem:** To sort a stack of playing cards into fifteen piles, each with a specified total value and combination of color, then to place these piles in a designated place. (I, III)

- 360. Number of piles correctly completed and located.
- 361. Time taken to complete the task.



Situation 37: Preferences for  
Group Problems.

Problem: To discuss the activities of the session and rank them in order of preference. (I, II)

370. Time taken to rank the alternatives.

371. Rank assigned the various activities.

Situation 38: Jury Judgment.

Problem: To discuss a set of facts involving a case at law, and to arrive at a decision as to the guilt of the defendant, then to listen to additional facts designed to sway their decision, to discuss these and again decide upon a verdict. (II, III)

380. Time taken to reach original decisions.

381. Time taken to reach decisions following persuasive arguments.

382. The record of individual votes in making decisions.

385. Number of arguments the group hears after making its original decision

Situation 39: Target throw.

Problem: To throw a ball at a dart type target 10 times, to keep track of and report the score earned. This was done with the Experimenter out of the room. (II, III)

390. Number of times target was hit (as recorded on a carbon paper under it).

391. Actual score earned (computed for groups hitting target only 10 times, from the carbon record).

392. Score reported by the group.

Situation 40: Crypts.

Problem: To decode a series of simple crypts. (II, III)

400. Number of crypts for which the correct key was discovered.

401. Number of words correctly decoded.

402. Time taken to break crypts.

Situation 41: Leader Selection.

Problem: To select a leader to serve for the next period of group activity. (I, II)

411. Number of candidates nominated.

412. Number of ballots needed to complete selection.

413. Record of votes awarded the different candidates.

In Table 7, the Master List of Variables we give a more complete description of each variable, as well as of the way it was treated for entry into a matrix, the number in the left hand column was assigned such that the area from which the measure comes is indicated by the first digit, while the particular measure (and in the case of measures of group performance, the situation) is indicated by the second and third digits. To some extent the mathematical treatment of the measure is indicated by the numbers to the right of the decimal point. The convention used is as follows:

|           |   |
|-----------|---|
| 000 - 099 | Population measurements (PT) such as personality scores |
| 100 - 199 | Sociometric measurement (SR)                            |
| 200 - 299 | Observers Ratings (OR) of the group or of its members   |
| 300 - 399 | Measurements of the group performance.                  |

Mathematical treatment:

|     |  |
|-----|--|
| .01 | Raw Score  |
| .1  | Mean   |
| .2  | Variance   |
| .3  | Level of Aspiration Measurement  |
| .4  | A Ratio  |
| .6  | An increment computed by taking the difference between measurements of similar performances.                         |
| .7  | Miscellaneous, locally defined measures making use of special treatments on selected portions of the available data. |

The numbers in the three right hand columns are of use only in locating the variable in the three sets of correlation and factor matrices.

Table 7.

## Master List of Variables and Scores

| Variable Number | Score Number |   | Matrix Identification Number |    |     |
|-----------------|--------------|---|------------------------------|----|-----|
|                 |              |   | I                            | II | III |
| 001             |              | PT Friendly Cyclothymia vs Taciturn Schizothymia (A)<br>People scoring high on this personality dimension prefer situations involving interactions with people; those scoring low prefer not to deal with people but rather with inanimate objects.   |                              |    |     |
|                 | 001.1        | PTM Mean of distribution of scores of the ten group members.  | 1                            | A1 | A1  |
|                 | 001.2        | PTV Variance of the distribution of scores for the ten group members.   | 17                           | C1 | C1  |
| 002             |              | PT General Intelligence (B)<br>The measure used is largely one of analogies and classifications. (Verbal)   |                              |    |     |
|                 | 002.1        | PTM Mean  | 2                            | A2 | A2  |
|                 | 002.2        | PTV Variance  | 18                           | C2 | C2  |
| 003             |              | PT Emotional Maturity vs General Neuroticism (C)<br>People scoring high on this measure are not greatly bothered by drives which cannot be satisfied immediately. They do not lean on defense mechanisms to channelize their basic needs into socially acceptable behavior patterns as much as do people who are lower on this dimension. |                              |    |     |
|                 | 003.1        | PTM Mean  | 3                            | A3 | A3  |
|                 | 003.2        | PTV Variance  | 19                           | C3 | C3  |
| 004             |              | PT Dominance (E)<br>High scores in this dimension are associated with assertiveness in social relations. As measured here this assertiveness tends to be associated with traces of egoism, some person-directed aggression and a lack of inhibitions rising from self-consciousness.  |                              |    |     |
|                 | 004.1        | PTM Mean  | 4                            | A4 | A4  |
|                 | 004.2        | PTV Variance  | 20                           | C4 | C4  |

005

PT Surgency vs Desurgency (F)  
 People high on this trait tend to be carefree and enthusiastic, and to enjoy situations in which there is bustle and excitement. People low in this scale are more serious, anxious and reserved and feel more at home in stable situations.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 005.1 | PTM Mean     | 5  | A5 | A5 |
| 005.2 | PTV Variance | 21 | C5 | C5 |

006

PT Positive Character integration (G)  
 High scores on this trait are found in people who have interiorized social norms and use them as rules of conduct. They tend to value perseverance and efficiency as ends in themselves.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 006.1 | PTM Mean     | 6  | A6 | A6 |
| 006.2 | PTV Variance | 22 | C6 | C6 |

007

PT Adventurous Cyclothymia vs Self-conscious, withdrawn schizothymia (H)  
 On this dimension variation is from outgoing sociability, adventurousness and strongly expressed emotional responsiveness, to general shyness and timid withdrawal.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 007.1 | PTM Mean     | 7  | A7 | A7 |
| 007.2 | PTV Variance | 23 | C7 | C7 |

008

PT Tender minded sensitivity vs Hard headed practicability (I)  
 People who score high on the dimension are described as impatient and demanding, but gently, sensitive and esthetic. The opposites are self-sufficient, tough, practical and realistic. In a college population students studying horticulture and fine arts have been found to score high while students studying engineering and business administration score low on this factor.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 008.1 | PTM Mean     | 8  | A8 | A8 |
| 008.2 | PTV Variance | 24 | C8 | C8 |

009

PT Paranoid Suspiciousness vs Lack of this trait (L)

High scores here correlate with jealousy, suspicion and self-centeredness. These people tend to avoid accepting the suggestions of others and devote rather more than the usual amount of time to examining the effects of their behavior in their associates.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 009.1 | PTM Mean     | 9  | B1 | B1 |
| 009.2 | PTV Variance | 25 | D1 | D1 |

010

PT Bohemian symbolic aggressiveness vs Practical concernedness (M)

The person high in this trait professes a disregard for social norms and for the effect of his behavior upon others, but show some conversion hysteric behavior. The opposite pole show anxiety to do the right thing and a tendency to become emotionally involved in what happens to others.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 010.1 | PTM Mean     | 10 | B2 | B2 |
| 010.2 | PTV Variance | 26 | D2 | D2 |

011

PT Polished fastidiousness vs Rough simplicity (N)

People who score high in this dimension are socially sophisticated intellectually trained and aloof. The opposite are clumsy but more warm-hearted.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 011.1 | PTM Mean     | 11 | B3 | B3 |
| 011.2 | PTV Variance | 27 | D3 | D3 |

012

PT Worrying, suspicious anxiety vs Calm trustfulness (O)

On this dimension variation is from subjectively felt free-floating anxiety with excessive concern over trivial mistakes, an inability to relax, and an aversion to undertaking any but routine tasks - to the opposite characteristics.

|       |              |    |    |    |
|-------|--------------|----|----|----|
| 012.1 | PTM Mean     | 12 | B4 | B4 |
| 012.2 | PTV Variance | 28 | D4 | D4 |

|     |       |   |    |    |    |
|-----|-------|---|----|----|----|
| 013 |       | PT Radicalism vs Conservation (Q <sub>1</sub> )<br>High scores here are associated with a willingness to subject conventions and authority to examination with a possibility of rejecting or modifying them. They also indicate intellectual and "rational" as opposed to concrete and "matter of fact" interests.  |    |    |    |
|     | 013.1 | PTM Mean  | 13 | B5 | B5 |
|     | 013.2 | PTV Variance  | 29 | D5 | D5 |
| 014 |       | PT Independent self-sufficiency vs Lack of resolution (Q <sub>2</sub> )<br>High scores here are made by people who are very self-contained and accustomed to deciding their own fate, with little regard to the reactions of the group. They tend to be task-oriented rather than gregariously oriented.  |    |    |    |
|     | 014.1 | PTM Mean  | 14 | B6 | B6 |
|     | 014.2 | PTV Variance  | 30 | D6 | D6 |
| 015 |       | PT Deliberate will control vs Lack of independence (Q <sub>3</sub> )<br>High scores here indicate people who are "strong willed", restrained, and who consciously maintain long term goals and values. In contrast to people high in Q <sub>2</sub> above, these people may feel the social pressures and temptations but they reject them if incompatible with ethical values. |    |    |    |
|     | 015.1 | PTM Mean  | 15 | B7 | B7 |
|     | 015.2 | PTV Variance  | 31 | D7 | D7 |
| 016 |       | PT Nervous tension (Q <sub>4</sub> )<br>This dimension is a measure of liability to physical symptoms of nervousness especially over-activity of the vegetative nervous system.   |    |    |    |
|     | 016.1 | PTM Mean  | 16 | B8 | B8 |
|     | 016.2 | PTV Variance  | 32 | D8 | D8 |
| 050 |       | PT Attitudes. Influence of Discussion<br>Distribution of changes in expressed attitudes of ten group members for each of five statements when the response preceeding the group meeting is compared with the past discussion response.  |    |    |    |

|        |   |    |    |
|--------|---|----|----|
| 050.1  | Quantity of change  | 66 | L7 |
| 050.2  | Decrease in variance,<br>of the distribution of individual responses<br>following the group discussion and vote<br>on a statement.  | 67 | L5 |
| 062    | <u>Interests. Distribution of individual<br/>"investments" (see p_____)</u>   |    |    |
| 062.2  | Decrease in variance.<br>The variance for a distribution of individual<br>"investments" in the groups first two<br>choices made before the group discussion<br>less the same measure for the distribu-<br>tion of "post-discussion" investments.  | 84 | K1 |
| 064.1  | Persistence of individuality of individual<br>choice. The mean investment, following<br>group discussion by group members in the<br>two choices ranked highest by the group<br>less their investments in the same items<br><u>before the group discussion.</u>  | 85 | J8 |
| 100    | Classification. Sociometric ratings.<br>All scores numbered in this category<br>are based on ratings made by group<br>members. The ratings were made in<br>semi-privacy in a mimeographed booklet<br>following each group activity. Responses<br>were made by writing the numbers of<br>other members (or by circling selections<br>from a printed list), and by checking a<br>position in an 8 point scale. Except where<br>otherwise specified a high score indicates<br>the selection of many people, or a positive<br>response to the item.<br><br>The session number and situations in which<br>the data that was used in computing scores<br>for the factor matrix is shown in parentheses<br>following the item description. |    |    |
| 100    | Sociotellc selection<br>Item: "Indicate by circling their numbers which<br>two members of this group you now prefer to be<br>in the same group with you for future tasks of<br>this sort". (II-30, 31, 32, 38, 39, 40; III-30,<br>35, 38, 39, 40)   |    |    |
| 100.71 | Index of Group Assimilation   | M4 | F8 |
|        | Formula:- $\frac{N \sum V^2 - (\sum V)^2}{N^2 - (\sum V)^2}$  |    |    |

V are votes (i.e., sociometric selections) and N refers to the number present in the group. v gives a theoretical distribution awarding all available votes to as few as possible people.

|     |  |    |    |    |
|-----|--|----|----|----|
| 101 | SR Satisfactory co-workers<br>(sociotelic selection)   |    |    |    |
| 102 | SR Rejected Co-workers<br>(sociotelic rejection)<br>Item: Assuming that the program at later sessions will be similar to this one, encircle the members of this group that you would wish to remain in the group with you and check the numbers of these members whom you would prefer to have allocated to some other group (I-II-III 37)<br>1 2 3 4 5 6 7 8 9 10 |    |    |    |
|     | 101.1 Mean number of members circled   | 33 |    | E1 |
| 103 | SR Number of clear speakers<br>Item: In every group there are some members whose contributions stand out because of effective speaking habits and clear expression of ideas. Regardless of whether you agree or disagree with what they say, you can easily hear and understand them. ....(II-31; 40)  |    |    |    |
|     | 103.1 Mean number of clear speakers  |    | K3 |    |
| 107 | SR Number of negative effecters<br>Item: It often happens that a group would make better progress if certain people were not present. Which members of this group do you place in this category? Encircle these ... (I-33, 36, 37; II-38, 37; III-33, 38, 36, 37)  |    |    |    |
|     | 107.1 SR Mean number of members circled  | 34 | K2 | E2 |
|     | 107.7 SR   |    |    | 08 |
| 108 | SR Number of significant members<br>Item: Some groups are so closely knit that the removal of any one person changes its complexion. For which persons, if any, in this group would this be the case? .... Consider yourself as available for choice ....(I-37; II-37; III-37)   |    |    |    |



|        |  |    |    |    |
|--------|--|----|----|----|
| 108.1  | SR Mean number circled   | 35 | K6 | F3 |
| 108.7  | SR   |    |    | 07 |
| 109    | SR Personal Acceptance   |    |    |    |
| 110    | SR Personal Rejection<br>SR Selection of two group members in response to "indicate which of the persons in this group you like best (least) because of the kind of persons they seem to be." (II-30, 31, 32, 37)                      |    |    |    |
| 109.71 | Index of group assimilation (IGA) for personal acceptance.<br><br>Formula:- $\frac{N \sum V^2 - (\sum V)^2}{N \sum v^2 - (\sum v)^2}$  |    | L3 |    |
| 110.71 | IGA for personal rejection<br><br>Formula: $\frac{N \sum V^2 - (\sum V)^2}{N \sum v^2 - (\sum v)^2}$   |    | M3 |    |
| 111    | SR Selection as friends<br>Item: "If you were to chose personal friends from among this group, which members would you choose? Write here their numbers in the order of your choice. (six blanks follow) (III-37)                      |    |    |    |
| 111.7  | Sociocenters for friendship<br><br><u>Number of members receiving more than five votes.</u>  |    |    | F5 |
| 112    | SR Judged leaders.<br>Item: Whom do you judge to have been the leaders of this group throughout these meetings? Write their numbers here in the order of your choice. You may choose any number up to six." (III-37)                   |    |    |    |
| 112.7  | Sociocenters for leadership<br><br><u>Number of members receiving more than five votes.</u>  |    |    | F4 |
| 114    | SR Influence of formal leaders<br>Rating (all ratings were made in an 8 point scale) in response to: "To what extent do you think any differences were due to their being a definitely known leader in this session". (II-37) (III-37) |    |    |    |

|        |   |    |       |
|--------|---|----|-------|
| 114.1  | Mean rating   | K8 | F2    |
| 115    | SR Influence of formal leader<br>Rating in response to: "To what extent did the existence of a known leader help or hinder this group in finding a solution"? (III-33, 35, 36, 38, 40)  |    |       |
| 115.1  | Mean rating   |    | E5    |
| 116    | SR Satisfaction with leader<br>Rating in response to: "How satisfied are you with what the leader did in this (name of situation)." (II-30, 37, 39; III-30, 37, 39)   |    |       |
| 116.1  | Mean rating, three situations   |    | F1    |
| 116.11 | Mean rating, situation 37   | K5 |       |
| 116.12 | Mean rating, situation 30 and 39  | L1 |       |
| 117    | SR Rated enjoyment<br>Rating in response to: "How much enjoyment did you get out of just being with this group in this situation"? (I-32, 36, 37; II-39, 37; III-36, 39, 37)  |    |       |
| 117.1  | SR Mean of rating by all members responding   | 36 |       |
| 118    | SR Felt freedom to participate,<br>Rating in response to: "How free did you feel to bring up objections and partly formulated suggestions in this (name of situation)"? (A low rating indicates "did feel free".) (I-32, 36, 37; II-31, 32, 37, 38; III-36, 37, 38, 39) |    |       |
| 118.1  | SR Mean of rating by all group members who responded.   | 37 | K1 E3 |
| 119    | SR Felt acceptance<br>Rating in response to "To what extent did you feel you were really accepted as a member of this (name of activity) group? (I-30, 31, 32, 37; II-30, 31, 32, 37, 38, 39, 40; III-30, 35, 37, 38, 40)   |    |       |
| 119.1  | SR Mean   | 38 |       |
| 120    | SR Feeling about session<br>Rating in response to: "How do you feel about this whole session?" (II-37, III-37)  |    |       |
| 120.1  | Mean rating   | K7 |       |

|       |  |    |    |    |
|-------|--|----|----|----|
| 121   | SR Importance of experience<br>Rating in response to: "How much do you think any differences between this session and the first depended upon your greater familiarity with the kind of thing you were asked to do"? (III-37)  |    |    |    |
| 121.1 | Mean rating  |    |    | E8 |
| 122   | SR Optimism for groups future<br>Rating in response to: "How well do you think this group would work together if an additional meeting were held"? (I-35, 37; II-37; III-37)   |    |    |    |
| 122.1 | SR Mean  | 39 |    |    |
| 124   | SR Commonness of purpose<br>Rating in response to: "To what extent did you feel that the individual members were striving toward common purposes in this activity"? (I-36, 37; II-37; III-36, 37)  |    |    |    |
| 124.1 | SR Mean  | 40 |    |    |
| 125   | SR Extent of unitariness<br>Rating in response to: "To what extent do you feel the participants acted as a unified group rather than as a disjointed collection of individuals"? (I-30, 31, 32, 33, 35, 36, 37; II-30, 31, 32, 37, 38, 40; III-30, 33, 35, 36, 37, 38, 40)   |    |    |    |
| 125.1 | SR Mean  | 41 | J8 | E4 |
| 126   | SR Satisfaction with overall efficiency.<br>Rating in response to: Although you may or may not be in agreement with the particular decisions this group reached, how satisfied were you with the way the group reached its decisions? Base this rating on the overall efficiency with which the group proceeded to its solutions. (I-31, 32, 35; III-31, 32) |    |    |    |
| 126.1 | SR Mean  | 42 |    |    |
| 127   | SR Excellence of group decisions<br>Rating in response to: Assume that you are an expert and have been asked to rate the recommendations or conclusions reached by your group as to their quality or degree of excellence. (II-32)   |    |    |    |
| 127.1 | Mean rating  |    |    | K4 |

SR Morale

Rating in response to: "Indicate how you would rate the morale or "esprit de corps" of this group. (II-34, III-34)

129.1 Mean rating L2

131 SR Satisfaction with group conformity  
Rating in response to: "How satisfied were you with the way the group followed the rules in this situation." (III-39)

131.1 Mean rating E6

200 Classification. Observer Ratings  
These ratings were made by observers following each situation, and an "overall rating" was made at the end of each session. The raw ratings, made on an eight point scale were converted to ipsative scores in order to minimize the effect of inter-observer differences.  
In the session I matrix only the "overall ratings" made at the close of the meeting were used. These are all numbered 2xx, 7. In the session II and III matrices the mean rating based on all situations except 34 and 39 (which were used for only approximately one half of the sample) was used.

201 OR Group organization 73 E1 G1  
Low rating indicates no apparent structure. Very high rating indicates rigid structure.

202 OR Leadership technique 74 E2 G2  
Low rating indicates authoritarian leadership in which leader dictated what to do and how to do it. High rating indicates decisions reached by explicit group decision.

203 OR Degree of leadership 75 E3 G3  
Low rating indicates little or no leadership was noted and a high one the presence of "distinct and persisting leadership.

204 OR Orderliness of procedure 76 E4 G4  
Low rating indicates lack of orderliness.

205 OR Freedom of Group atmosphere 77 E5 G5  
Low rating indicates a restrictive atmosphere dominated by a few. High indicates a permissive, free group without cliques.

|       |  |    |    |    |
|-------|--|----|----|----|
| 206   | OR Degree of we-feeling<br>Low indicates lack of apparent "we-feeling" and a tendency to speak in terms of personal rather than of group reference.  | 78 | E6 | G6 |
| 207   | OR Degree of frustration<br>Low rating indicates a lack of apparent frustration.   | 79 | E7 | G7 |
| 208   | OR Degree of interdependence<br>Low rating indicates independent individual behavior uncoordinated with that of other group members. High rating represents coordination and interdependence.  | 80 | E8 | G8 |
| 209   | OR Motivation<br>High rating indicates high motivation to accomplish the group task as set by the experimenter.  | 92 | F1 | J1 |
| 210   | OR Tension-energy level<br>High rating indicates high motivation to accomplish the group task whether or not the de facto task is that set by the experimenter. 209 and 210 are related in that 209 cannot be high except when 210 is high, but 210 may remain high when 209 is quite low. |    | F2 | J2 |
| 211   | OR Amount of interpersonal conflict<br>A high score indicates there was little or not interpersonal conflict. (Note: 211 and 212 were scored on a five point scale.)   |    | F3 | J3 |
| 212   | OR Extent group activity was directed toward the situational goal.<br>A high rating indicates that the activity of the group was in fact largely directly toward the goal set by the experimental conditions.  |    | F4 | J4 |
| 213   | OR Explicit concern with procedure.<br>Low rating indicates little attention and discussion given to planning. High rating indicates detailed explicit plans are worked out before undertaking a task.   | 93 | F5 | J5 |
| 250   | OR Assessment of leadership<br>Following each activity the observer circled the number of each group member who had in his judgment shown leadership.  |    |    |    |
| 250.1 | Mean number of members circled   | 82 |    | F6 |

|        |  |    |    |
|--------|--|----|----|
| 251    | CR Assessment of "principle leaders"<br>The person judged to have been the<br>"principle (or most important) leader"<br>in each situation.   |    |    |
| 251.0  | Number of principle leaders  | 83 | F7 |
| 260    | OR Count of verbal participations<br>The tally of remarks made by each<br>member. One tally was counted for<br>each uninterrupted contribution whether<br>it consisted of a single word or several<br>minutes of uninterrupted speech.   |    |    |
| 260.71 | Index of Group Participation.<br><br>Findley's formula was used to get an<br>index of evenness of verbal participa-<br>tions; the formula is:<br><br>$100 \frac{N(\sum X)^2 - 2N\sum X^2}{(N-2)(\sum X)^2}$<br>Where N = number of people in the group.<br>X = number of speeches by a member. | M5 |    |
| 261    | OR Participation classified according<br>to content<br>Each remark was evaluated according to<br>its content and apparent affective conse-<br>quences. (see Appendix _____)  |    |    |
| 261.72 | Expressive-Malintegrative behavior<br>index.<br>The total number of negatively toned<br>affective remarks divided by the total<br>of negatively plus positively toned ones.<br>(1) p.142)  | M6 |    |
| 261.73 | Ratio: Task-oriented answers to<br>questions.<br>The number of questions answered, or<br>bits of information provided, divided<br>by the number of questions asked of<br>members by members.   | M7 |    |
| 261.74 | Ratio: Emotional to task-oriented content.<br>Number of remarks classified as<br>emotional in nature divided by the number<br>classified as problem or task oriented in<br>nature.   | M4 |    |
| 300    | Construction Speed.<br>Time per unit of work completed.<br>Mean for two trials.  |    |    |

|         |   |    |    |    |
|---------|---|----|----|----|
| 300.1   | Speed   | 58 | M2 | L2 |
| 301     | Construction: Planning time<br>Total time, for two trials, taken to decide on aspiration estimate and to plan attack on the problem.  |    |    |    |
| 301.1   | Planning Time, mean   | 52 | F7 | L5 |
| 301.22  | Decrease in planning time.<br>Time for trial 1 divided by time for trial 2.   | 53 | F6 | L6 |
| 302     | Construction: Aspiration estimates<br>The estimated time reported by the group of how long it would require to complete the construction task. The estimates were made immediately before beginning each trial. They were made with knowledge of norms for the task.    |    |    |    |
| 302.310 | "Realism" of aspiration.<br>The absolute value for $A'' = (p' + p_a)$ where $A''$ is the estimate made for trial 2, $p'$ is the groups first performance, and $p_a$ is the reported average for other groups.   | 58 |    |    |
| 302.3   | "Optimism" of aspiration<br>"Realism" (302.310) with sign attached.   | 59 | L8 | L4 |
| 302.33  | "Inconstancy" of aspiration<br>The absolute size of the difference between the two aspiration estimates.  | 60 | M1 | L3 |
| 302.34  | Absolute level of aspiration<br>The sum of the estimates for two trials.  | 61 |    |    |
| 304     | Construction: Learning<br>Score 300 computed for each trial separately. Trial 1 then subtracted from trial 2.   |    |    |    |
| 304.61  | Learning score  | 57 |    |    |
| 310     | Group judgment: Accuracy.<br>Total number of points awarded on the basis of accuracy of answers to all questions (Four in session 1, three in session 2) A graduated point system was used so that some credit was earned for answers which were approximately correct. |    |    |    |
| 310.1   | Accuracy score  | 54 | F8 |    |

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|--------|--|----|----|
| 311    | Group judgment: Speed of reaching decisions.<br>Total time, within allowable limits used for four decisions.   |    |    |
| 311.1  | Speed  | 55 | G1 |
| 320    | Attitudes: Group vote<br>Distribution of votes taken by a show of hands following four minutes group discussion.   |    |    |
| 320.17 | Radicalism score.<br>The mean vote, multiplied by the Thurstone weight for extremity of the statement. A high score indicates a "radical vote".                        | 65 |    |
| 320.2  | Extent of public agreement.<br>The mean amount of variance in the distribution of "public votes".  |    | L4 |
| 320.4  | Conformity facade.<br>The difference between the variance for the distribution of public votes and the variance for the distribution of post-discussion private votes. |    | L6 |
| 331    | Guessing game: Volume of questions<br>Number of questions asked in attempting to discover what the experimenter was thinking.  |    |    |
| 331a.0 | Number of questions seeking answer to "easy" item.   | 43 |    |
| 331b.0 | Number of questions seeking answer to "difficult" item.  | 44 |    |
| 331a.1 | Mean number of questions seeking answer to "easy" items.   |    | K8 |
| 331b.1 | Mean number of questions seeking answer to "difficult" items.  |    | K2 |
| 331a.4 | Rate of questioning (seconds per question) for the "easy" item.  | 45 |    |
| 331.4  | Rate of questioning (easy and difficult items)   |    | K4 |
| 332    | Guessing game: Time needed to get answer.<br>This measure was computed for the "easy" items only because there were no successes for the others                        |    |    |
| 332a.0 | Time used  | 46 |    |
| 332a.1 | Mean time for two items  |    | L1 |



|          |   |    |    |    |
|----------|---|----|----|----|
| 332b.1   | Time used for difficult items   |    |    | K3 |
| 340      | Dynamometer jerking pull.<br>The maximum pull attained during a thirty second period. Instructions were to reach the highest possible level and sustained pressure was not required.      |    |    |    |
| 340.1    | Mean for all trials   | 70 |    |    |
| 340.6    | Increase in level attained for second trial over level for first trial  | 68 |    |    |
| 341      | Dynamometer sustained pull.<br>The lowest point to which the dynamometer was allowed to drop during a 15 second period. Instructions were to maintain the strongest possible steady pull. |    |    |    |
| 341.1    | <u>Total pull</u> Mean score for n trials   | 71 | G3 | O3 |
| 341.6    | Increase<br>Score for second trial less score for first trial   | 72 |    |    |
| 342      | Dynamometer sustained pull under conditions of shock (see 341)  |    |    |    |
| 342.1    | Mean score for three trials   |    | J1 | M1 |
| 342.2    | Variability of performance<br>The absolute sum of the deviations for each of three trials about the mean for the trials.  |    | I8 | M6 |
| 342.6    | Increment while under shock<br>Level for the third trial less the level for the first   |    | I5 | M4 |
| 342.61   | Between sessions change<br><br>Mean level of pull (under shock conditions) for session III less the mean level for session II.  |    |    | M7 |
| 343      | Dynamometer aspiration estimate<br>The groups' estimate of how well it will perform. An estimate was made immediately before each trial. No norms were provided.                          |    |    |    |
| 343a.321 | Jerking pull. Optimism<br>The estimate for the coming trial less the mean level achieved on previous trials.  | 69 |    |    |

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|----------|--|----|----|
| 343b.321 | Sustained pull. Optimism<br>As for 343a.321 above, except that estimates were made for the sustained pull.   | 81 |    |
| 344      | Dynamometer aspiration estimates when anticipating shock   |    |    |
| 344.321  | Optimism of aspiration (see 343.321)   | I4 | M3 |
| 345      | Dynamometer. Comparison of performance under shock and non-shock conditions.   |    |    |
| 345.7    | Decrement with shock<br>The difference between the pre-shock, "warm up" performance (341.1) and the <u>mean</u> of the three performances under shock conditions.  | I7 | M2 |
| 345.71   | Immediate shock decrement.<br>The difference between the pre-shock performance and the <u>first</u> shock performance.   | I6 | M5 |
| 350      | Interests: Speed of ranking preferences<br>Time required to arrange eleven choices in order of preference.   |    |    |
| 350.0    | Speed of ranking   | 50 |    |
| 351      | Interests: Speed of voting<br>Time required to weight preferences (350) by dividing 100 votes among them.  |    |    |
| 351.0    | Speed of voting  | 51 |    |
| 352      | Division of Interest votes.<br>After ranking eleven alternatives in order of preference the group was asked to divide 100 votes among them.  |    |    |
| 352.71   | Concentration of resources<br>The extent votes were concentrated in high ranking preferences as measured by multiplying the number of votes assigned to an item by its rank in the preference list.  | 86 |    |
| 352.72   | Inconsistency of decisions.<br>The extent that the rank of the number of votes was inconsistent with the rank of the preference assignments. Measured by subtracting the votes given each item from the votes given each item ranked higher; then summing all negative values. | 87 | J7 |

|        |   |    |  |    |
|--------|---|----|--|----|
| 353    | Interests. Group choices  |    |  | J6 |
| 353.7  | Socialized<br>The sum of ranks for the alternatives<br>requiring most interaction divided by<br>the sum of the ranks for those requiring<br>least.                                |    |  |    |
| 360    | Card sorting. Accuracy<br>Number of stacks meeting the required<br>conditions   |    |  |    |
| 360.0  | Accuracy score  | 47 |  | K7 |
| 361    | Card sorting. Speed<br>Time taken to complete the task. A<br>maximum of six minutes was allowed.  |    |  |    |
| 361.1  | Mean time. Time used divided by<br>number of correct stacks.  | 48 |  | K6 |
| 361.6  | Improvement score.<br>Time for session III less time for<br>session I   |    |  | K5 |
| 370    | Discussion. Speed of ranking preferences<br>Time taken to arrange activities into<br>order of preference.   |    |  |    |
| 370.1  | Mean time per preference ranked   | 49 |  | H1 |
| 371    | Discussion. Rank of situation preference<br>Rank assigned each situation in terms of<br>liking for it, following a six minute<br>discussion at the close of meetings I and<br>II. |    |  |    |
| 371a.4 | Rank of preference for construction<br>situation  | 62 |  | G4 |
| 371b.4 | Rank of preference for Group Judgment<br>situation  | 63 |  | G7 |
| 371c.4 | Rank of preference for Attitude<br>situation  | 64 |  | G6 |
| 371d.4 | Rank of preference for Guessing Game<br>situation   | 88 |  |    |
| 371e.4 | Rank of preference for Dynamometer<br>situation   | 89 |  |    |
| 371f.4 | Rank of preference for Interests<br>situation   | 90 |  |    |
| 371g.4 | Rank of preference for Card Sorting<br>situation  | 91 |  |    |

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|---------|--|----|----|
| 37lh. 4 | Rank of preference for Jury Judgment situation   | G8 |    |
| 37li. 4 | Rank of preference for Crypts situation  | G5 |    |
| 37l. 7  | Discussion. Verbal-motor preference ratio.<br>The activities of session II were classified as to whether they involved primarily verbal tasks (31, 32, 38, 40) or motor tasks (30, 34, 39). The ratio of the former to the latter was then computed. |    |    |
| 380     | Jury Judgment. Volumn of argumentation<br>The time taken to decide upon a verdict.   |    |    |
| 380.1   | Mean for two cases   | H3 | N3 |
| 381     | Jury Judgment. Suggestibility<br>Measure of the extent and way the group was influenced by arguments presented to it after its first decision was reported.  |    |    |
| 381.1   | Suggestibility I. The mean amount of time used to entertain an argument presented after the original decision,   | H6 | O2 |
| 381.2   | Consistency of suggestibility. The variance for the distribution of scores used to compute 381.1.  | I2 | N6 |
| 382     | Jury Judgment. Votes on original decision.<br>Count of votes <u>for</u> the verdict, <u>opposed</u> to it, and <u>abstained</u> .  |    |    |
| 382.1   | Suggestibility II<br>The percent of votes switched in the vote following the last argument heard on a case, in comparison with the original vote in the case.  | H5 | O1 |
| 382.4   | Unanimity of original decisions II.<br>Number of votes cast with the majority divided by the total number of votes cast. One total was computed for the two cases heard in each session.   | H4 | N7 |
| 382.71  | Unanimity of original decisions I<br>For the first decision in each case the number of minority votes was subtracted from the majority. This was divided by the total number voting.   | I1 | N8 |

|        |  |    |    |
|--------|--|----|----|
| 385    | Jury Judgment. Group shift score<br>The number of arguments presented to the group.  |    |    |
| 385.0  | Suggestibility III.<br>Total number of arguments heard.<br>(up to 3 per case unless decision reversed earlier)   | I3 | N2 |
| 385.4  | Jury Judgment. Suggestibility IV.<br>The mean time spent in reaching decisions following arguments meant to change the decision divided by the time spent in reaching the original decision. | H7 | N4 |
| 387    | Jury Judgment. Relative influence of logical and of authoritative arguments.   |    |    |
| 387.4  | Logic-authority influence ratio.<br>Mean time spent in discussing logical arguments divided by mean time spent in discussing authoritative arguments.  | H8 | N5 |
| 390    | Target Throw. Number of trials made.<br>The number of dots found in a carbon paper inserted behind the target - i.e. the number of times the target was hit.                                 |    |    |
| 390.0  | Number of throws   | G2 | M8 |
| 390.71 | Discrepancy score<br>An empirical score assigned on the basis of number of times the group actually hit the target in excess of their allowed ten throws.                                    | J2 | N1 |
| 391    | Target Throw. Actual score.  |    |    |
| 392    | Reported score.<br>Score which the group reported it had earned in the Experimenter's absence.   |    |    |
| 400    | Crypts. Number for which the correct key was discovered.   |    |    |
| 401    | Crypts. Number of words deciphered.  |    |    |
| 401.1  | Rate of production<br>Time divided by number of words correctly deciphered   | J6 | L7 |
| 402    | Crypts. Time   |    |    |
| 402.0  | Time saved.<br>The difference between the total time allowed the group and the time that it took in solving four crypts completely.  | J7 | L8 |

- 411 Leadership selection. Number of candidates nominated.
- 411.1 Mean number of group members nominated and voted on in the first ballot at each election. J5
- 412 Leadership selection. Number of ballots taken
- 412.1 Mean number of ballots required to select a leader
- 413 Leadership selection. Record of votes received.
- 413.7 Index of original agreement. J3  
The mean percent of votes cast which were received in the first ballot by the person elected leader.

## CHAPTER IV

### The Group Dimensions Found in the First Session

Before correlations are made for factorization one needs to give attention to scaling, normality of distribution, linearity of correlation plot and test-retest reliability of the measures made. No conspicuous abnormalities were found in the conditions governing correlation and most variables were scaled down to a fifteen point scale before product moment correlations were calculated.

The problem of test reliability is a difficult one. Since groups are unlikely to have the stability of individuals we should have preferred consistency (split half) coefficients to stability (test-retest) coefficients, but there could not be obtained, by the very nature of certain tests. However, it was important to get reliabilities whenever possible for in understanding the factor structure we badly needed (with these presumably low reliabilities) to be able to correct the loadings for attenuation, in order to glimpse the true pattern. It must be mentioned at the outset, because it is of interest to group dynamics apart from factor analysis, that the reliabilities of group performances were low, as indicated in Tables 8 and 9.

Let us, however, first describe and define the variables correlated for the first, officially leaderless performances of the neonate groups. They are listed in relation to other sessions in Table 7 - The variables having an entry in the first of the three columns after the titles.

Factorization of the correlation matrix (not reproduced here on account of its size) carried out by the multiple-group method (4) resulted in 15 factors before residuals became negligible. Rotations, carried out by the single sectional view method, gave an unimprovable simple structure after 18 over-all rotations. The simple structure thus obtained, in terms of percentage of variables in each  $\pm 0.10$  loading hyperplane, is not quite as good as in individual personality factorizations with populations of the same size, but was as stable as it could be made.

The Rotated Factor-Matrix (actually a reference vector matrix) is set out in the appendix, while the following pages contain lists of the significantly loaded variables in each factor, together with a brief interpretative description of each.

It should be understood that the somewhat unwieldy titles used for each factor are meant to be contingent -- the real label is the factor number at least until further evidence permits clear interpretation. The verbal factor label here is an attempt at maximum description in a few words and only where relatively high confidence of meaning is gained does it become interpretive. It should be noted that in the following descriptions the verbal labels have already been inverted to agree with the sign of the loading in the particular factor. For example, if "Preference for the Dynamometer" has come out with a negative loading it is written "Dislike of Dynamometer" and a negative loading in Surgency causes the variable to be described as Desurgency. A similar procedure has been carried out in all the succeeding factor pattern tables.

**Factor 1. Vigorous Unquestioned Purposefulness  
-vs- Self-conscious Unadaptedness**

| Variable<br>Matrix No. | Descriptive Title*   | Factor<br>Loading |
|------------------------|--|-------------------|
| 7                      | PTM Adventurous cyclothymia (H)                                  | .69               |
| 70                     | Dynamometer jerking pull: Total pull                             | .68               |
| 63                     | Discussion: Dislike for Group Judgment Situation*                | -.65              |
| 15                     | PTM Deliberate Will Control (Q <sub>3</sub> )                    | .63               |
| 6                      | PTM Positive Character Integration (G)                           | .62               |
| 89                     | Discussion: Preference for Dynamometer Situation                 | .61               |
| 4                      | PTM Dominance (E)  | .51               |
| 11                     | PTM Polished Fastidiousness (N)                                  | .48               |
| 12                     | PTM Calm trustfulness*-(O)                                       | -.46              |
| 38                     | SR Felt acceptance by other group members                        | .43               |
| 16                     | PTM Lack of nervous tension* (Q <sub>4</sub> )                   | -.41              |
| 30                     | PTM Wide range of Independent self-sufficiency (Q <sub>2</sub> ) | .41               |
| 40                     | SR Commonness of purpose   | .40               |
| 83                     | OR Many "principal" leaders                                      | .36               |
| 37                     | SR Members do feel free to participate*                          | -.32              |

\*The title shown here is not necessarily the same as that shown for the same variable in Table 1. In this and the following factor loading tables, the descriptive title will in all cases describe the performance of the group, with regard to the variable being measured, which goes along with the positive pole of the factor. Wherever this change in title has been made, it has been indicated by an asterisk (\*). The sign of the correlation, however, has not been changed.

Three characteristics combine in this factor: (1) Population personality characteristics of adventure, vigor, dominance, purposefulness, orderly, willed application and freedom from anxiety (H, E, G, Q<sub>3</sub>, N and O-); (2) Self-ratings in the group of feeling accepted and of working to a common goal; (3) High performance upon, and a liking for, coordinated vigorous action, with dislike for discussion and ill defined tasks ("Group Judgment"). It resembles Factor V in the Wispe study (9) and, by total sense but not marker variables, the factor of "vigorous, self-willed order" in national culture patterns (2) (6).

The most likely explanation here would seem that the group performance and the feeling of acceptance in the group arise primarily from the interaction of personalities having these personality factors.

**Factor 2. Immediate High Synergy  
-vs- Low Motivation**

| Variable<br>Matrix No. | Descriptive Title                        | Factor<br>Loading |
|------------------------|--|-------------------|
| 9                      | PTM Lack of paranoid suspiciousness* (L) | -.85              |
| 75                     | OR High degree of leadership             | .63               |
| 76                     | OR High degree of group orderliness      | .53               |
| 79                     | OR Low degree of frustration             | -.53              |
| 78                     | OR High degree of we-feeling             | .50               |



|    |  |      |
|----|--|------|
| 16 | PTM Low amount of nervous tension* ( $Q_4$ )             | -.49 |
| 3  | PTM High level of emotional maturity ( $C_1$ )           | .47  |
| 12 | PTM Low level of worrying, suspicious anxiety* ( $O$ )   | -.46 |
| 92 | OR High level of motivation                              | .46  |
| 73 | OR High degree of group organization                     | .42  |
| 71 | Dynamometer: High score on sustained pull                | .40  |
| 14 | PTM Low level of independent self-sufficiency* ( $Q_2$ ) | -.35 |
| 80 | OR High degree of interdependence                        | .31  |

Essentially here we have a collection of observer ratings such as would be implied by our hypothesis of synergy. The group appears highly motivated, cohesive, and desirous of a high degree of leadership. "Sustained pull" is perhaps the performance which would be expected most directly to reflect simple high general motivation.

Again, however, the highest loadings are in population characters and on general principles we would therefore expect these to be the "cause" of the associated group performances. Personality factors of warm-heartedness ( $L$ , freedom from paranoia), emotional maturity, and freedom from anxiety and nervous tension are here thrown together, possibly as a second order factor.

Our hypothesis will be that in neonate groups the immediate determiner of the synergy level is the population personality level in freedom from paranoia, general emotionality, anxiety and tension. It is interesting that the access of synergy shows itself so early not only in we-feeling and motivation but also in orderliness and the development of leadership.

### Factor 3. Democratic, Explicit Procedure-orientation - vs - Horde Urgency

| Variable<br>Matrix No. | Descriptive Title  | Factor<br>Loading |
|------------------------|--|-------------------|
| 93                     | OR Much concern with procedure   | .90               |
| 75                     | OR High degree of leadership   | .63               |
| 73                     | OR High degree of group organization   | .62               |
| 52                     | Construction: Much time spent in planning  | .56               |
| 85                     | <u>Interests: Members show much persistence in individuality*</u>  | -.54              |
| 77                     | OR High degree of freedom of group atmosphere  | .46               |
| 84                     | <u>Interests: Low decrease in variance of individual investments</u><br>investments about group preferences* | -.44              |
| 91                     | Discussion: Dislike for Card Sorting situation   | -.43              |
| 81                     | <u>Dynamometer sustained pull: Optimism of aspiration</u>  | .42               |
| 35                     | SR Many members rated as making significant contributions  | .41               |
| 92                     | OR High degree of motivation   | .40               |
| 89                     | Discussion: High preference for Dynamometer situation  | .37               |
| 78                     | OR High degree of we-feeling   | .37               |
| 68                     | Dynamometer jerking pull: Much increase with practice  | .37               |

This has several variables expressing one meaning of the term democratic: concern with procedure and planning, participation of several significant individuals, freedom of group atmosphere (observed, but not significant in self ratings) and in preservation of individuality of opinions despite group discussion. On the other hand some observers have offered the interpretation that groups high in this factor lack concern with and confidence about, a goal,

with the result that they expend an inordinate amount of energy in "maintenance synergy". Whatever the interpretation we see on detailed examination that the validity of the rating on procedure is supported by the loading of the actual measure of time spent planning. This emphasis on procedure seems related also to leadership and organization development, to optimism on dynamometer and to dislike of the exacting task of card sorting. These latter give it a slight resemblance to a former factor (9) of Easy verbal activity -vs- Fortitude. At the negative pole is a marked "horde" pattern (3) wherein individuals change their opinions toward those of the group, show increase in homogeneity, and throw themselves into tasks with a sense of urgency and without preamble. The factor has only very slight relation to personality factors, (C and M), and must be considered to arise largely from a group structural character of institutionalizing procedure, for this is loaded 0.9.

Factor 4. Schizothyme Rigidity  
-vs- Conformity to Circumstances

| Variable<br>Matrix No. | Descriptive Title   | Factor<br>Loading |
|------------------------|---|-------------------|
| 59                     | Construction: Not optimistic in aspiration*                   | -.80              |
| 58                     | " Realistic in aspiration                                     | .78               |
| 61                     | " Low absolute level of aspiration*                           | -.73              |
| 53                     | " Do most of planning before trial 1                          | .53               |
| 1                      | PTM Friendly cyclothymia (A)                                  | .37               |
| 31                     | PTV Narrow range of Deliberate Will Control (Q <sub>3</sub> ) | -.34              |
| 89                     | Discussion: High preference for Dynamometer situation         | .33               |
| 33                     | SR Wish to retain few of present members in future meetings   | -.32              |
| 15                     | PTM Low level of Deliberate Will Control (Q <sub>3</sub> )    | -.31              |

This factor is probably of less significance than its rank order indicates, because of spurious correlations among three construction-aspiration variables, which should fall lower in the factor. Its central feature is a schizoid like high and unadaptable aspiration level (also in the dynamometer), with rigidity also in starting with little planning and in failing to reduce planning when it proves unprofitable. There is also evidence of low orderliness of procedure but satisfaction with co-workers. Since this factor has the highest loading of the population measure of schizothymia (A-) it may be that the whole pattern is to be ascribed to a summation of such personalities.

Factor 5. High Intrinsic Synergy  
-vs- Low Intrinsic Synergy

| Variable<br>Matrix No. | Descriptive Title                                       | Factor<br>Loading |
|------------------------|---|-------------------|
| 41                     | SR High rated integration                               | .82               |
| 42                     | SR High satisfaction with overall efficiency            | .70               |
| 39                     | SR High optimism for group's activities                 | .57               |
| 36                     | SR High rated enjoyment of the group's activities       | .54               |
| 40                     | SR Much commonness of purpose                           | .52               |
| 38                     | SR Members tended to feel accepted by the group         | .49               |
| 37                     | SR Members <u>did not</u> feel free to participate*     | -.35              |
| 81                     | Dynamometer sustained pull: High optimism of aspiration | .34               |
| 27                     | PTV Wide range in Polished Fastidiousness (N)           | .32               |
| 71                     | Dynamometer sustained pull: High total score            | .32               |
| 70                     | Dynamometer jerking pull: High total score              | .31               |
| 80                     | OR High degree of interdependence                       | .30               |

While the measures from the sociometric area tend to overshadow the others, this factor relates every panel of measurement in the present experiment. Because of this we have rejected the possibility that it might be an artifact arising from some common response set, or treatment of the Likert type continua items used in the ratings, though such an artifact may have served to elevate these loadings.

The three items loading the factor highest have no other significant loadings in the entire matrix. What they seem to have in common is an immediate enjoyment of the group life itself (though the sociometric ratings of actual individuals do not come here). That the ratings represent more than a subjective feeling, however, is attested by the observer rating of group interdependence and by the dynamometer performances which we have found before to be good indices of group motivation. There are slight personality associations with large scatter on both "polished fastidiousness" and dominance, which might mean less individual competitiveness (e.g. for leadership) than if the group were homogeneous.

However, though we are dealing with a synergy level pattern, akin to that in factor 1, it seems difficult to ascribe it similarly to personality levels. It must arise from inter-relations of persons which generate in some groups a higher level of gregarious satisfactions than exist in others. This source of synergy clearly corresponds to what we have called in our theoretical analysis (1) intrinsic synergy i.e., that synergy which arises from the stimulus of social contacts themselves, and which has also been noted in group data by Hemphill (12). The heart of this factor seems to me to be a warm smoothly functioning group process characterized as inter-dependence in the observer ratings. Resulting from this the members feel accepted and do well in performance. I do think that the personality factors found here fit beautifully and indicate that this integration and interdependence results from a lack of competition for intra-group status.

#### Factor 6. Intelligent Role Interaction -vs- Low Morale I.

| Variable<br>Matrix No. | Descriptive Title  | Factor<br>Loading |
|------------------------|--|-------------------|
| 1                      | PTM High Friendly Cyclothymia (A)                                    | .51               |
| 21                     | PTV High Variance, Surgency (F)                                      | .50               |
| 29                     | PTV High Variance, Radicalism (Q <sub>1</sub> )                      | .50               |
| 22                     | PTV " " Positive Character Integration (G)                           | .45               |
| 54                     | Group Judgment: High level of accuracy                               | .45               |
| 23                     | PTV High Variance, Adventurous Cyclothymia (H)                       | .40               |
| 60                     | Construction: Little difference between aspiration estimates*        | .40               |
| 12                     | PTM High level of Radicalism (Q <sub>1</sub> )                       | .38               |
| 2                      | PTM High level of Intelligence (B)                                   | .36               |
| 52                     | Construction: Little plannings*                                      | -.35              |
| 85                     | Interests: Members show increased preference for the group's choices | .35               |
| 70                     | Dynamometer jerking pull: High total score                           | .33               |

The characteristics of this factor are a high mean in population intelligence, intellectual interest (possibly radicalism) and cyclothymia; a high scatter in as many as four other factors; a "good" performance in some group work, notably judgment and coordinated action on the dynamometer. Variable 60 in this context may indicate refusal to disregard reported norms in consequence of a single experience and 52 a quick resolution of problems of organization.

This factor has considerable resemblance to the largest in our earlier pilot study (9), there labelled Intelligent "Esprit de corps" or Morale I. There is the same propensity for intellectual problems, the same intelligent mutual understanding without time spent in discussion (coordination) and the same adaptability, both in group aspiration (10) and the adjustment of individual interests to those reached in group discussion (85).

Our hypothesis then, which was that these characteristics might arise from a higher intelligence level in the population, is confirmed here to the extent that Personality Factor B is significantly loaded, as found in no other syntality factor. However since the higher loadings are in variances the possible modification must be considered that this higher "group intelligence" arises not only from higher mean population intelligence and information but also from more varied group resources and better "role differentiation".

Factor 7. Democratic "Savoir faire"  
-vs- Lack of Self Possession

| Variable<br>Matrix No. | Descriptive Title   | Factor<br>Loading |
|------------------------|---|-------------------|
| 47                     | <u>Card Sorting</u> : High number right                                 | .76               |
| 79                     | OR Low degree of frustration  | -.45              |
| 48                     | <u>Card Sorting</u> : High rate of completion*                          | -.43              |
| 18                     | <u>PTV narrow range of intelligence (B)</u>                             | -.36              |
| 89                     | <u>Discussion</u> : Low preference for the dynamometer situation        | -.34              |
| 74                     | OR democratic type of leadership technique                              | .34               |
| 20                     | PTV wide range of dominance (E)   | .34               |
| 31                     | PTV wide range of deliberate will control (Q <sub>3</sub> )             | .34               |
| 43                     | <u>Guessing Game</u> : Ask few questions for "easy" items*              | -.32              |
| 38                     | <u>SR Members</u> do not feel accepted by the group                     | -.31              |
| 8                      | PTM Members tend to be tender-minded, not hard headed (I)               | -.31              |
| 72                     | <u>Dynamometer</u> sustained pull: Show increased success with practice | .31               |
| 11                     | PTM High level of polished fastidiousness (N)                           | .30               |

The group performances outstanding here are those which benefit through individuals acting on their own but with awareness of the needs of others and with conscientiousness. Their success comes not from warmth of immediate interaction but from group values in the individuals which cause them to act appropriately in isolation. Performances are unhurried economical of words but effective. The members are rated as unfrustrated and satisfied with co-workers but they do not feel themselves as highly accepted, while the leadership procedures are democratic and permissive.

A similar factor, involving good guessing game performance, a similar dislike of physical performance, high interest in polished, esthetic activity, self criticisms, and insusceptibility to emotional appeal was found in the pilot study (9) and called "Friendly Urbanity, savoir faire -vs- lack of group self-possession". Some observers have wished to call the present factor "Laissez faire" -vs- control of individuality. The present title is a compromise, intended to express a bi-polarity between independent group respecting action, which is one essence of democracy, and some degree of regimentation required by lack of self possession. It remains for later research to investigate the relation of the two independent dimensions of democratic organization found here-- that opposed to urgency (Factor 3) and that opposed to control of individuality (Factor 7) -- to the definition used by Lippitt (13) and Lewin and presumably combining these and other meanings of democracy.

The origin of the present pattern can scarcely lie in population personality means, if the loadings of the latter should prove, even with other rotations, to be no higher than here. Yet it is striking that the group characteristics are just those one would expect to be associated with personality factors I- and N.

#### Factor 8. High Verbal Interaction

| Variable Matrix No. | Descriptive Title                                   | Factor Loading |
|---------------------|---|----------------|
| 5                   | PTM High surgency (F)                               | .60            |
| 63                  | Discussion: Preference for Group Judgment           | .58            |
| 71                  | <u>Dynamometer</u> sustained pull: High total score | .57            |
| 69                  | " " jerking pull: not optimistic                    | -.52           |
| 88                  | Discussion: Low preference for Guessing Game*       | -.39           |
| 7                   | PTM High level of Adventurous Cyclothymia (H)       | .36            |
| 77                  | OR not a free group atmosphere*                     | -.35           |

This is almost certainly a factor arising from a personality factor -- surgency. The preferred activities are those involving talking and the high sustained rope pull might well also spring from the high "primitive passive sympathy" (2). It is noteworthy, in view of McDougall's theory of extrovert authoritarianism (14) that this factor contains a negative loading on freedom of group atmosphere.

#### Factor 9. Recklessness

| Variable Matrix No. | Descriptive Title   | Factor Loading |
|---------------------|---|----------------|
| 86                  | <u>Interests:</u> Group concentrates its resources (votes) on its highest preferences | -.87           |
| 87                  | <u>Interests:</u> Few inconstancies in group decisions                                | -.81           |
| 51                  | <u>Interests:</u> Short time taken to cast votes*                                     | -.59           |
| 91                  | Discussion: Low preference for Card Sorting*  | -.43           |
| 69                  | <u>Dynamometer</u> jerking pull: Not optimistic                                       | -.36           |

Some raising of the top loadings has probably occurred here through measures being derivative from a single situation. The high groups tend to perform the interest ranking quickly, to concentrate interest on a few alternatives only and to change little from the order assigned earlier. Together with the low optimism and the failure to improve on successive dynamometer pulls, as well as the high level of personality factor I, this suggests a kind of recklessness, but requires more variables to clarify.

#### Factor 10. Group Elation -vs- Group Phlegm

| Variable<br>Matrix No. | Descriptive Title   | Factor<br>Loading |
|------------------------|---|-------------------|
| 45                     | <u>Guessing Game</u> : Slow rate of questioning                     | .60               |
| 46                     | " " " " Short time taken to get "easy" answer*                      | -.57              |
| 78                     | OR high degree of we-feeling  | .46               |
| 77                     | OR high freedom of group atmosphere                                 | .43               |
| 70                     | <u>Dynamometer jerking pull</u> : High total pull                   | .43               |
| 26                     | <u>PTV Wide variance in Bohemian Symbolic Aggressiveness</u><br>(M) | .39               |
| 92                     | OR High degree of motivation  | .38               |
| 80                     | OR High degree of interdependence                                   | .36               |

This is a psychologically consistent pattern of behavior involving a slow rate of questioning, probably a result of the group's taking time to consider and formulate its questions, a quick arrival at the solution, high we-feeling, motivation, etc. It cannot be accounted for by any population characteristic present in the matrix. Our hypothesis is that it is a situationally engendered excitement or elation level.

#### Factor 11. Homogeneity of Emotional Maturity

| Variable<br>Matrix No. | Descriptive Title  | Factor<br>Loading |
|------------------------|--|-------------------|
| 19                     | PTV Uniform Emotional Maturity (C)                               | -.94              |
| 69                     | <u>Dynamometer jerking pull</u> : Optimistic aspiration estimate | .60               |
| 94                     | <u>Random number</u>   | .41               |
| 72                     | <u>Dynamometer sustained pull</u> : Improvement with practice    | .38               |

Perhaps we may infer from this factor that when members are more nearly of the same level of emotional maturity they tend to have more confidence in each other (as shown by higher aspiration in a real situation) and are able to learn better. At least it is evident that homogeneity of emotional maturity is an important independent dimension, though its full associations can scarcely be glimpsed with the limited related variables here.

#### Factor 12. Disregard of Group -vs- Acceptance of Group Goals

| Variable<br>Matrix No. | Descriptive Title   | Factor<br>Loading |
|------------------------|---|-------------------|
| 62                     | <u>Discussion</u> : Preference for Construction Situation   | .80               |
| 90                     | <u>Discussion</u> : Low preference for Interests Situation* | -.41              |
| 77                     | OR Free group atmosphere                                    | .40               |

|    |   |      |
|----|---|------|
| 4  | PTM Dominance (E)   | .38  |
| 65 | <u>Interests: Members show increased preference for the</u><br>group's choice | .38  |
| 47 | <u>Card Sorting: Few stacks correct*</u>                                      | -.37 |
| 71 | <u>Dynamometer sustained pull: Low total score*</u>                           | -.34 |
| 64 | <u>Discussion: Low preference for Attitude situation</u>                      | -.31 |

Although loadings below .40 can only be accepted as suggestive and not as of definite significance we may include several in these last few factors of smallest variance in order to help our tentative interpretations of the total pattern. Here the high groups like construction, dislike attitude, interest and group judgment discussions, and are poor at performances requiring coordination. There is a suggestion of dominant individuals yet of tendency to modify opinions toward the group. Experimenters with experience in observing many groups, high and low, are inclined to interpret this factor as an evasion of group life, associating the construction preference with impersonal activity, dawdling and horse-play (for which casualness the dominance may be a pre-requisite): It seems a condition in which the individual has not really accepted the group as a means to his ends, and has some similarity to the Withdrawal factor IV in the pilot study.

Factor 13. Frustrating Temperamental Heterogeneity  
-vs- Morale from Homogeneity

| Variable<br>Matrix No. | Descriptive Title  | Factor<br>Loading |
|------------------------|--|-------------------|
| 24                     | PTV High variance in tender-minded sensitivity (I)           | .62               |
| 25                     | PTV High variance in paranoid suspiciousness (L)             | .54               |
| 26                     | PTV High variance in bohemian symbolic aggressiveness<br>(M) | .47               |
| 71                     | <u>Dynamometer sustained pull: Low score*</u>                | -.44              |
| 49                     | <u>Discussion: Slow speed of ranking preferences</u>         | .41               |
| 64                     | <u>Discussion: Low preference for attitude situation</u>     | -.40              |
| 34                     | SR Many members rated as hindering the group's progress      | .38               |

Here we find the existence of wide ranges of individual differences on the personality traits of tendermindedness, suspiciousness, and bohemianism associated with poor performance on the sustained dynamometer pull, learning thereon, taking a long time to reach decisions in the Discussion situation, a dislike of the Attitude situation and a reported feeling that many members hindered the group process.

The performance measures here seem fairly clearly to be consequences of the personality variances which load the factor. These may operate by making it difficult to achieve agreement wither as to goals (the slow speed of ranking may be due to this) or as to how to achieve them.

The factor appears to be worthy of careful consideration on the part of those people concerned with assembling teams or work groups, such as small ship or air crews. Thus, grouping people who are alike whether they are high or low on these three traits, could be expected to result in a reduction in the amount of "personality conflict", as well as in misunderstandings which result from the different perceptual systems associated with different ranges of these scales, and which lead to loss of effectiveness and to accidents. It may be worth pointing out that the fact that these are variance, rather than mean, scores would allow this kind of classification to be done with essentially no attrition.

# Factor 14. Diffidence in Internal Communications

| Variable Matrix No. | Descriptive Title   | Factor Loadings |
|---------------------|---|-----------------|
| 52                  | <u>Construction:</u> Low amount of planning                             | -.61            |
| 53                  | " " Planning is done predominately for first trial                      | .50             |
| 55                  | <u>Group Judgment:</u> Fast in reporting decisions                      | -.47            |
| 19                  | <u>PTV Low variance in Emotional Maturity (C)</u>                       | -.38            |
| 44                  | <u>Guessing Game:</u> Ask few questions in trying for "difficult" items | -.36            |
| 56                  | <u>Construction:</u> Slow rate  | .34             |
| 4                   | <u>PTM Low level of Dominance (E)</u>                                   | -.31            |

This factor has little variance but was recognized by participating observers as one of inhibition of verbal interaction presumably through the diffidence of low dominance and large variations in emotional maturity. Discussion activity lags, but manual activities are done quickly, though with little planning and somewhat poor results.

A fifteenth factor, loading liking for guessing game, the presence of many negative effectors and high H variance, also reached simple structure but had little variance left. It is interpreted by group observers as a factor of anarchy and disruptedness, but can be regarded only as a suggestive indication.



## CHAPTER V

### The Group Dimensions Found in the Second Session

It will be recalled that in order to increase the area of behavior over which our understanding of the action of a factor may be gained we adopted a certain design in patterning the distribution of tests over the three sessions. This design aimed to keep certain tests common to two sessions, while introducing new ones in each session. If the former would permit cross-session identification of factors then the latter "extensions" would increase in each session the area of factor behavior known to belong to the factor.

With this reminder of the design we shall simply list in this chapter the factors found in the second session and leave to Chapter VIII the discussions of matching. The list of overlapping variables has already been given in Table 1 and Table 7 lists the whole universe of variables.

As before, the correlations were product-moment on scaled scores and the factor extraction was by the multi-group method. This time seventeen factors were extracted, and as none vanished in rotation, seventeen were preserved. The correlation matrix, unrotated matrix and rotated matrix, as well as angles among reference vectors are set out in the appendix. The simple structure was not so readily obtained in this case as in the other two rotations, which may be of significance in determining our confidence where matching fails. But the angles among the factors are all practically orthogonal.

As before the half-dozen or so variables above a loading of about .40 are alone listed seriously, though fringe variables down to .30 are sometimes included for inspection. Discussion will be given here only to factors which are not later matched with others and therefore, fully described later, though all will be set out.

#### Factor I

| Variable  | Descriptive Title   | Loading |
|-----------|---|---------|
| F1 209.1  | OR: High motivation for the group task                                  | 71      |
| E6 206.1  | OR: High degree of we-feeling   | 66      |
| F2 210.1  | OR: High tension-energy level   | 64      |
| G3 341.1  | Dynamometer: High level of non-shock pull                               | 64      |
| E1 201.1  | OR: High level of group organization                                    | 61      |
| F5 213.1  | OR: Much explicit concern with procedure                                | 56      |
| E8 208.1  | OR: High degree of interdependence                                      | 53      |
| E3 203.1  | OR: High degree of leadership   | 52      |
| E5 205.1  | OR: Much freedom of group atmosphere                                    | 48      |
| E4 204.1  | OR: Much orderliness of procedure                                       | 46      |
| F4 212.1  | OR: High proportion of activity directed<br>toward the situational goal | 42      |
| J1 342.1  | Dynamometer: High mean level of<br>electrified pull                     | 39      |
| I6 345.71 | Dynamometer: Large immediate shock decrement                            | 38      |

Later matched with Session I, T2 and  
Session 3, T1

## Factor II

| Variable  | Descriptive Title   | Loading |
|-----------|---|---------|
| L1 116.12 | SR: Interim satisfaction with leader                          | 82      |
| K5 116.11 | SR: Satisfaction with leader at end of session                | 63      |
| K8 114.1  | SR: Formal leader rated to have strongly influenced group     | 60      |
| J8 125.1  | SR: Group unification rated high                              | 55      |
| M6 261.72 | OR: High index of expressive-malintegrative behavior          | 50      |
| F6 301.22 | Construction: No decrease in amount of time spent in planning | -49     |
| L3 109.71 | SR: I. G. A. for personal acceptance                          | 47      |
| K4 127a.1 | SR: Excellence of group decisions                             | 44      |
| A1 001.1  | PTM: Cyclothyme -vs- Schizothyme (A)*                         | -42     |
| K7 120.1  | SR: Feels session is "good"                                   | 42      |
| F8 310.1  | Group Judgment: Accuracy is low*                              | -39     |

Later matched with Session 1, T5 and Session 3, T2

## Factor III

|           |  |     |
|-----------|--|-----|
| H3 380.1  | JJ: Large volume of argumentation                | 64  |
| H6 381.1  | JJ: Suggestibility I: Much discussion            | 63  |
| A6 006.1  | PTM: Little positive character integration (C)*  | -58 |
| B3 011.1  | PTM: Rough simplicity (N)*                       | -58 |
| H5 382.1  | JJ: Suggestibility II: Many decisions switched   | 57  |
| I3 385.0  | JJ: Suggestibility III: Many arguments presented | 49  |
| F7 301.1  | Construction: Much planning                      | 48  |
| A7 007.1  | PTM: Self-conscious, withdrawn schizothyme (H)*  | -45 |
| C6 006.2  | PTV: Positive character integration (G)*         | -45 |
| G7 3716.4 | Discussion: Low rank assigned group judgment     | 42  |

Later matched with Session 3, T5 and possibly T1 F7 (-) in a triangle of matches.

## Factor IV

|           |   |     |
|-----------|---|-----|
| G6 371c.4 | Discussion: Low rank assigned attitudes situation       | 63  |
| B8 016.1  | PTM: Nervous tension (C <sub>4</sub> )                  | 62  |
| H2 372.4  | Discussion: Prefer physical activity situations         | 61  |
| B2 010.1  | PTM: Bohemian unconcernedness (M)                       | 51  |
| B4 012.1  | PTM: Anxiety (O)  | 51  |
| B7 015.1  | PTM: Low level of will-control (Q <sub>3</sub> )        | -49 |
| G4 371a.4 | Discussion: High rank assigned construction             | -44 |
| I2 381.2  | JJ: Tend to give equal amounts of time on all arguments | -42 |
| H5 382.1  | JJ: Suggestibility II: Few decisions switched           | -39 |

Later matched with Session 3, T4 (-)

# Factor V

| Variable  | Descriptive Title   | Loading |
|-----------|---|---------|
| M6 261.72 | High index of expressive-malintegrative behavior                      | 61      |
| K2 107.1  | Few negative effectors  | -55     |
| M2 300.1  | Construction: Rapid rate of   | -46     |
| B6 014.1  | PTM: Low level of self-sufficiency (Q <sub>2</sub> )                  | -43     |
| C2 002.2  | PTV: Uniform level of intelligence (B)                                | -40     |
| D2 010.2  | PTV: High variance in bohemian unconcernedness (M)                    | 35      |
| E7 206.1  | OR: High degree of frustration  | 35      |
| H1 370.1  | Discussion: Little time required to rank five items                   | -35     |
| K3 103.1  | SR: Many rated as clear speakers                                      | 33      |
| L4 320.2  | Attitude: Low variance in distribution of votes<br>by a show of hands | -30     |

Later matched with Session 3, T10 (-) and  
possibly Session 1, T18 (-) (but not a triangle)

# Factor VI

|            |  |     |
|------------|--|-----|
| M2 300.1   | Rapid speed of construction                  | -79 |
| E7 207.1   | OR: High degree of frustration               | 76  |
| A6 006.1   | PTM: Positive character integration (G)      | 52  |
| M1 302.33  | Construction: Inconstancy of aspiration      | -46 |
| I4 344.321 | Dynamometer: Optimism of aspiration          | 35  |
| F4 212.1   | OR: Low proportion of goal directed activity | -32 |
| F3 211.1   | OR: Large amount of interpersonal conflict   | -30 |

Later matched with Session 1, T9(-) and  
Session 3 T6 (but not a triangle)

# Factor VII

|           |   |     |
|-----------|---|-----|
| L3 109.71 | High I.G.A. for personal acceptance   | 51  |
| B1 009.1  | PTM: Paranoid suspiciousness (L)  | 46  |
| A4 004.1  | PTM: Dominance (E)  | -46 |
| G2 390.0  | TT: High number of throws recorded  | 44  |
| H6 381.1  | JJ: Suggestibility I: Little discussion of<br>supplementary arguments                                 | -40 |
| G5 3711.4 | Discussion: High rank assigned to crypts  | -39 |
| B2 019.1  | PTM: Bohemian unconcernedness (M)   | 35  |
| H7 386.4  | JJ: Suggestibility IV: Spend proportionately more<br>time on original decisions<br>than on later ones | -33 |
| K3 103.1  | SR: Large number of clear speakers  | 31  |

Later matched with Session 1, T6(-) and  
Session 3 T7

### Factor VIII

| Variable  | Descriptive Title  | Loading |
|-----------|--|---------|
| M5 260.71 | JJ: Index of group participation   | 81      |
| L6 321.4  | Attitudes: Less disagreement in public than<br>in privately expressed opinions | 57      |
| E3 203.1  | OR: Low degree of leadership   | -48     |
| G1 311.1  | Group Judgment: Fast speed of decision reaching                                | -46     |
| H5 382.1  | JJ: Suggestibility II: High percent of votes switched                          | 40      |
| I3 385.0  | JJ: Suggestibility III: Hear many arguments before<br>changing decision        | 35      |
| E4 204.1  | OR: Orderliness of procedure (low)   | -35     |
| M4 100.71 | IGA: Sociotelic criteria   | -34     |
| L4 320.2  | Attitudes: High unanimity of voting by show of hands                           | -30     |

Later matched with Session 1, T3 (-)

### Factor IX

|           |   |     |
|-----------|---|-----|
| J3 413.7  | Leadership selection: Index of original agreement           | 81  |
| J5 411.1  | Leadership: Few candidates on first ballot                  | -60 |
| J4 412.1  | Leadership: Few ballots per election                        | -58 |
| H2 371.4  | Discussion: Prefer physical activity situations             | 50  |
| F2 210.1  | OR: Low tension-energy level                                | -44 |
| G4 371a.4 | Discussion: High rank assigned construction                 | -42 |
| F1 209.1  | OR: Motivation for group task                               | -41 |
| H8 387.4  | JJ: Spend more time discussing authoritative<br>arguments * | -37 |
| F4 212.1  | OR: Low proportion of goal oriented activity                | -35 |

Later matched with Session 3, T13

### Factor X

|           |   |     |
|-----------|---|-----|
| H4 382.4  | JJ: Original decisions have strong majorities   | 59  |
| C8 008.2  | PTV: Imaginative sensitivity (I)                | -49 |
| F6 391.22 | Construction: Most planning done for trial 1    | 49  |
| A8 008.1  | PTM: Not imaginative sensitivity (I)            | -40 |
| I1 382.71 | JJ: Unanimity of original decision I (M-)       | 38  |
| J1 342.1  | Dynamometer: Low mean level of electrified pull | -34 |
| C3 003.2  | PTV: Emotional stability (C)                    | 33  |
| D2 010.2  | PTV: Bohemian unconcernedness (M)               | -31 |
| A2 002.1  | PTM: Intelligence (B)                           | 30  |
| B2 010.1  | PTM: Lack of bohemian unconcernedness (M)       | -30 |
| J2 390.71 | TT: Discrepancy score                           | 30  |

Later matched with Session 1 T11 (-) and  
Session 3 T9 (no triangle)

# Factor XI

| Variable  | Descriptive Title   | Loading |
|-----------|---|---------|
| H7 386.4  | JJ: Suggestibility IV: Spend more time discussing experimenters arguments than in reaching original decisions | 46      |
| H2 372.4  | Discussion: Prefer physical activity situations   | 45      |
| F6 301.22 | Construction: Most planning done for trial 1  | 41      |
| J1 342.1  | Dynamometer: Low level of electrified pull  | -40     |
| I2 381.2  | JJ: Tend to consider each argument for equal length of time   | 39      |
| E2 202.1  | OR: Democratic technique  | 37      |
| L2 129.1  | Low morale rating following dynamometer   | -33     |
| J4 412.1  | Leadership: Many ballots needed to select leader  | 32      |
| G3 341.1  | Dynamometer: Low level of non-shock pull  | -31     |
| I7 345.7  | Dynamometer: Much decrement with shock  | 30      |
| I2 391.71 | IT: Discrepancy score   | 30      |

Later matched with Session 1, T14 and Session 3, T15(-) (triangle)

# Factor XII

|          |   |     |
|----------|---|-----|
| A7 007.1 | PTM: Adventurous cyclothymia (H)  | 48  |
| A5 005.1 | PTM: Surgency (F)   | 44  |
| G3 341.1 | Dynamometer: High level of non-shock pull   | 44  |
| B3 711.1 | PTM: Genteel sophistication (N)   | 44  |
| A3 003.1 | PTM: Emotional stability (C)  | 43  |
| I6 401.1 | Crypts: Fast rate of production   | -35 |
| A4 004.1 | PTM: Dominance (E)  | 34  |
| B4 012.1 | PTM: Anxiety (O)  | -33 |
| A8 008.1 | PTM: Imaginative sensitivity (I)  | -33 |
| I7 386.4 | JJ: Suggestibility IV: Spend less time discussing experimenters arguments than in reaching original decisions | -32 |
| E3 203.1 | OR: Low degree of leadership  | -32 |
| G1 311.1 | Group Judgment: Slow speed of decision reaching   | 31  |
| F3 211.1 | OR: Small amount of interpersonal conflict  | 31  |

Later matched with Session 1 T1 and Session 3 T12(-) (triangle)

### Factor XIII

| Variable  | Descriptive Title  | Loading |
|-----------|--|---------|
| L5 050.2  | Attitudes: Increase in agreement   | 67      |
| D4 012.2  | PTV: Nervous tension (O)   | -44     |
| L7 050.1  | Attitudes: Much modification of privately expressed attitudes following discussion | 42      |
| A4 004.1  | PTM: Dominance (E)   | -42     |
| G7 3716.4 | Discussion: High rank of group judgment  | -41     |
| J1 342.1  | Dynamometer: Low mean level of electrified pull                                    | -39     |
| G2 390.0  | TT: Few illegal throws made  | -33     |
| M3 110.71 | IGA: For personal rejection  | 30      |

Later matched with Session 1, T12 (-)

### Factor XIV

|           |   |     |
|-----------|---|-----|
| I6 347.71 | Dynamometer: Immediate shock decrement                | 52  |
| D1 009.2  | PTV: Paranoid suspiciousness (L)                      | -51 |
| H3 380.1  | JJ: Low volume of argumentation                       | -48 |
| H8 387.4  | JJ: Discuss authoritative arguments longest           | -47 |
| J5 411.1  | Leadership: Many candidates nominated on first ballot | 45  |
| K8 114.1  | Formal leader rated uninfluential                     | -45 |
| H4 382.4  | JJ: Small majorities on original decision             | -44 |
| K5 116.11 | Low level of satisfaction with leader (O.A.)          | -44 |
| M5 260.71 | Index of group participation                          | -43 |
| K1 118.1  | Members did not feel free to participate              | 41  |
| D5 013.2  | PTV: Radicalism (Q <sub>1</sub> )                     | -39 |
| A6 006.1  | PTM: Positive character integration (G)               | 37  |
| I7 345.7  | Dynamometer: Decrement with shock                     | 37  |

Later matched with Session 3, T8

### Factor XV

|           |   |     |
|-----------|---|-----|
| A3 003.1  | PTM: Low level of emotional stability (C)     | -59 |
| G5 3711.4 | Discussion: Low rank of preference for crypts | 46  |
| M6 261.72 | Low index of malintegrative behavior          | -46 |
| C7 007.2  | PTV: Adventurous cyclothymia (H)              | 42  |
| A2 002.1  | PTM: Intelligence (B)                         | -39 |
| K3 103.1  | Many clear speakers                           | 39  |
| J6 401.1  | Crypts: Slow rate of production               | 38  |
| D8 016.2  | PTV: Nervous tension (Q <sub>4</sub> )        | -35 |
| L3 109.71 | I.G.A. for personal acceptance                | -35 |
| M4 100.71 | I.G.A.  | -35 |

This factor has slight resemblances of patterns to session 1, T4 and session 1, T2, but these are already matched and one in any case of larger variance. The essential feature is a combination of adventurous cyclothymia M6 261.72 with low emotional stability and somewhat low intelligence, with a liking for the crypt solutions game and an

excess of malintegrative behavior. The crypt-breaking game offered more scope for individual "brilliance" than almost any other situation and is perhaps for that reason liked in these rather disorganized groups of emotional and emotionally expressive people better than the more exacting tasks.

#### Factor XVI

| Variable  | Descriptive Title                                   | Loading |
|-----------|---|---------|
| C7 007.2  | PTV: Adventurous cyclothymia (H)                    | -45     |
| E2 202.1  | OR: Democratic leadership technique                 | 41      |
| M6 261.72 | High index of expressive-malintegrative behavior    | 37      |
| I2 381.2  | JJ: Spend equal time in considering all arguments   | 35      |
| G4 371a.4 | Discussion: Low rank of preference for construction | 34      |
| A2 002.1  | PTM: Low level of intelligence (B)                  | -33     |
| D3 011.2  | PTV: Genteel sophistication (N)                     | 32      |

This factor is also unmatched, but the negligible variance permits no sanction to attempts at interpretation

#### Factor XVII

|           |   |     |
|-----------|---|-----|
| D3 011.2  | PTV: Genteel sophistication (N)                             | -60 |
| B2 010.1  | PTM: Low level of bohemian unconcernedness (M)              | -38 |
| E2 202.1  | OR: Authoritative technique                                 | -37 |
| D2 010.2  | PTV: Uniform level of bohemian unconcernedness (M)          | -36 |
| I8 342.2  | Dynamometer: Uniform level of performance under shock       | 36  |
| I7 345.7  | Dynamometer: Large decrement of pull under shock conditions | 34  |
| I6 345.71 | Dynamometer: Immediate shock decrement                      | 33  |
| L7 050.1  | Attitudes: Quantity of change                               | 33  |
| B6 006.1  | PTM: Members gregariously oriented (Q <sub>2</sub> )        | -32 |
| D1 009.2  | PTV: Paranoid suspiciousness (L)                            | -31 |

Later matched with Session 1, T13 (-)  
the match being very good.

The above dimensions are discussed further  
after the data for Session 3 is presented.

## CHAPTER VI

### The Group Dimensions Found in the Third Session

The data for the third and last three hour session in the life of the group is presented here. Again a multi-group factorization was made, again using 101 variables. The analysis also had common variables with the previous session, instead of 29 as in the other two overlaps. (See Table 7). These are common syntality variables, additional, of course, to the 32 population personality variables which are always common.

The correlation matrix, unrotated and rotated matrices, inter-vector angles etc. are shown for session 3 in the appendix.

Again the factors will be presented as data without comment, except where a factor does not match anything, when it will be described here rather than later.

#### Factor 1

| Variable | Descriptive Title                             | Loading |
|----------|---|---------|
| G3 203.1 | OR: High quantity of leadership               | 73      |
| J5 213.1 | OR: Much explicit concern with procedure      | 68      |
| G1 201.1 | OR: High level of group organization          | 66      |
| G8 208.1 | OR: High level of interdependence             | 58      |
| G6 206.1 | OR: High degree of we-feeling                 | 51      |
| G4 204.1 | OR: Much orderliness in procedure             | 49      |
| A2 002.1 | PTM: High intelligence (B)                    | 46      |
| F3 108.1 | SR: Many significant members                  | 42      |
| M1 342.1 | Dynamometer: High mean level electrified pull | 40      |

Later matched with Session 1, T2 and  
Session 2, T1. (Triangle)

#### Factor 2

|          |  |      |
|----------|--|------|
| E4 125.1 | SR: High degree of group unity                     | 81   |
| F1 116.1 | SR: Much satisfaction with leader performance      | 78   |
| E5 115.1 | SR: Designated leader rated helpful                | 74   |
| F2 114.1 | SR: Overall influence of formal leader (high)      | 70   |
| E6 131.1 | SR: Much satisfaction with group conformity (T.T.) | 56   |
| E7 129.1 | SR: High Morale following dynamometer              | 54   |
| E2 107.1 | SR: Few negative effectors                         | - 52 |
| E8 121.1 | SR: Experience rated important                     | 52   |
| E3 118.1 | SR: Much felt freedom to participate               | - 43 |
| O8 107.7 | SR: Few members rejected more than five times      | - 42 |
| G7 207.1 | OR: Low degree of frustration                      | - 36 |

Later matched with Session 1, T5 and  
Session 2, T2.

motion and to show



### Factor 3

| Variable  | Descriptive Title  | Loading |
|-----------|--|---------|
| K4 331.4  | GG: High rate of questioning                             | 50      |
| A2 002.1  | Mean Factor B, intelligence                              | -42     |
| K2 3316.1 | GG: Many questions                                       | 42      |
| L6 301.22 | Construction: Most planning done for trial two           | -42     |
| J3 211.1  | OR: Much impersonal conflict                             | -41     |
| J1 209.1  | OR: Low motivation                                       | -39     |
| O6        | Group number   | 35      |
| J7 352.72 | Interests: Little inconsistency in ranking and weighting | -32     |

A tentative match with Session 1, Factor 4 (-) has been made

### Factor 4

|           |   |     |
|-----------|---|-----|
| B8 016.1  | PTM: Low nervous tension ( $Q_4$ )              | -65 |
| B4 112.1  | PTM: Low anxiety (O)                            | -60 |
| B2 010.1  | PTM: Low bohemian unconcernedness (M)           | -58 |
| A8 008.1  | PTM: Low imaginative sensitivity (I)            | -53 |
| B1 009.1  | PTM: Low paranoid suspiciousness (L)            | -50 |
| A7 007.1  | PTM: High adventurous cyclothymia (H)           | 50  |
| B7 015.1  | PTM: High will control ( $Q_3$ )                | 48  |
| M1 342.1  | Dynamometer: High level of electrified pull     | 46  |
| A3 003.1  | PTM: High emotional stability (C)               | 45  |
| L1 332a.1 | GG: Fast time for easy items                    | -43 |
| C6 006.2  | PTV: Uniform level of character integration (G) | -42 |
| A2 002.1  | PTM: Low intelligence (B)                       | -40 |
| B5 013.1  | PTM: Low radicalism ( $Q_1$ )                   | -38 |

A good match with Session 2, T4 (-) exists

### Factor 5

|          |                                       |     |
|----------|---------------------------------------|-----|
| L8 402.0 | Cryptograms: High time saving score   | 58  |
| N2 385.0 | JJ: Hear many arguments               | 52  |
| A8 008.1 | PTM: High imaginative sensitivity (I) | 46  |
| B3 011.1 | PTM: High genteel sophistication (N)  | -41 |
| F6 250.1 | OR: Many leaders observed             | 41  |
| A5 005.1 | PTM: Low surgency level (F)           | -40 |
| L5 301.1 | Construction: Little planning         | -40 |
| L7 401.1 | Cryptograms: Rate of production       | 37  |
| O6       | Group number                          | 37  |

Matched with Session F3 and Session 1 T8 (-) (no triangle)

# Factor 6

| Variable  | Descriptive Title                                       | Loading |
|-----------|---|---------|
| O2 381.1  | JJ: Spend much time discussing experimenter's arguments | 59      |
| N6 381.2  | JJ: Consider all arguments equally long                 | 59      |
| L1 332a.1 | GG: Much time used                                      | 57      |
| N3 380.1  | JJ: Spend much time to reach original decisions         | 49      |
| F6 250.1  | OR: Many leaders observed                               | 51      |
| J3 211.1  | OR: Much interpersonal conflict                         | -38     |
| K8 331a.1 | GG: Many questions for easy items                       | 37      |
| C4 004.2  | PTV: Uniform level of dominance (E)                     | -31     |
| E4 125.1  | SR: Participants not rated unified                      | -31     |

Matched with Session 2, T6

|           |  |     |
|-----------|--|-----|
| L7 401.1  | Cryptograms: Fast rate of production                         | -52 |
| A1 001.1  | PTM: Schizothym (A)  | -39 |
| B1 009.1  | PTM: High paranoid suspiciousness (I.)                       | 37  |
| M8 390.0  | TT: Many illegal throws                                      | 36  |
| J7 353.7  | Interests: Rank situations requiring less Interaction higher | 33  |
| C3 003.2  | PTV: Uniform level of emotional stability (C)                | -31 |
| K2 3316.1 | GG: Ask many questions in seeking answer to difficult item   | 30  |
| O2 381.1  | JJ: Spend little time discussing experimenter's arguments    | -30 |

Matched with Session 2, F7 and Session 1, F6(-) (triangle)

# Factor 8

|           |  |     |
|-----------|--|-----|
| M5 345.71 | Dynamometer: Much immediate shock decrement                  | 68  |
| M2 345.7  | Dynamometer: Much decrement with shock                       | 65  |
| O3 341.1  | Dynamometer: High level of non-shock pull                    | 51  |
| O4        | Random number with N of 41                                   | 46  |
| K3 3326.1 | GG: Take little time to get difficult answers                | -45 |
| N5 387.4  | JJ: Devote more time to logical than authoritative arguments | -43 |
| G7 207.1  | OR: Little frustration observed                              | -41 |

Matched with Session 2, F14

# Factor 9

|           |  |     |
|-----------|--|-----|
| N7 382.4  | JJ: Unanimity of original decisions II: large majorities     | 66  |
| N8 382.71 | JJ: Unanimity of original decision I: large majorities       | 64  |
| M6 342.2  | Dynamometer: Uniform level of shock performance              | -54 |
| M4 342.6  | Dynamometer: Little increase with practice (shock auditions) | -50 |
| F3 108.1  | SR: Few significant members                                  | -36 |

Matched with Session 2, F10

### Factor 10

| Variable | Descriptive Title   | Loading |
|----------|---|---------|
| Q8 107.1 | SR: Many members receive 5 or more nominations as hinderers               | 48      |
| E2 107.1 | SR: Many negative effectors   | 41      |
| E6 131.1 | SR: Little satisfaction with way rules followed in target throw situation | -39     |
| Q6 006.2 | PTV: Uniform level of positive character integration (G)                  | -39     |
| Q5       | Random with N = 80  | -38     |
| L2 300.1 | Construction: High speed of completion                                    | -38     |
| J1 209.1 | OR: High motivation   | 37      |
| B6 014.1 | PTM: High level of self-sufficiency (Q <sub>2</sub> )                     | 36      |

Matched with Session 2 F5 (-) fairly well only

### Factor 11

|           |   |     |
|-----------|---|-----|
| M8 390.0  | TT: Many illegal throws   | 71  |
| N1 390.71 | TT: High discrepancy score                                      | 53  |
| Q7 015.2  | PTV: Heterogeneous endowments in will control (Q <sub>3</sub> ) | 48  |
| N2 385.0  | JJ: (Suggestibility III): Many arguments heard                  | 45  |
| F5 111.7  | SR: Few receive more than 5 selections as friends               | -42 |
| E8 121.7  | SR: Groups previous experience: Had little influence on it      | -37 |
| A3 003.1  | PTM: Low level of emotional stability (C)                       | -36 |
| F7 251.0  | OR: Few principal leaders observed                              | -33 |
| N8 382.71 | JJ: Small majorities on original verdicts                       | -32 |

Although lacking any clear match elsewhere this seems a fairly stable and meaningful factor. It is clearly a factor concerned with what would be the equivalent of moral dependability -vs- unreliability in the individual. The undependable groups are also emotionally suggestible in the jury situation and have a low percentage of sociocenters and few leaders. This lack of group morale is associated with low emotional maturity in the population and a lack of homogeneity in the will-control factor Q<sub>3</sub>, presumably making a sturdy, democratic discussion unlikely.

### Factor 12

|          |   |     |
|----------|---|-----|
| A7 007.1 | PTM: Low level of adventurous cyclothymia (H)             | -56 |
| A4 004.1 | PTM: Low level of dominance (E)                           | -47 |
| A5 005.1 | PTM: Low level of surgency (F)                            | -47 |
| E6 131.1 | SR: High degree of satisfaction with group conformity     | 40  |
| N5 387.4 | JJ: Large proportion of time devoted to logical arguments | 40  |
| K6 361.1 | Card Sorting: Slow speed of sorting                       | 39  |
| A3 003.1 | PTM: Low level of emotional stability (C)                 | -38 |
| A6 006.1 | PTM: Low level of character integration (G)               | -37 |
| F3 108.1 | SR: Many significant members                              | 37  |
| B4 012.1 | PTM: High level of anxiety (O)                            | 36  |
| B7 015.1 | PTM: Low level of will control (Q <sub>3</sub> )          | -35 |

Matched with Session 1 F1 (-) and  
Session 2 F12 (-) (triangle)

### Factor 13

| Variable | Descriptive Title   | Loading |
|----------|---|---------|
| E1 101.1 | SR: Few rated as satisfactory                               | -75     |
| J1 209.1 | OR: Low motivation  | -55     |
| D7 015.2 | PTV: Uniform scores on will control (Q <sub>3</sub> )       | -54     |
| L5 301.1 | Construction: Little planning                               | -52     |
| M8 390.0 | TT: Many illegal throws                                     | 51      |
| D1 009.2 | PTV: Uniform level of paranoid suspiciousness (L)           | -50     |
| E6 131.1 | SR: High degree of satisfaction with group conformity       | 47      |
| F5 111.7 | SR: Few receive more than five selections as friends        | -47     |
| C2 002.2 | PTV: Wide variance in intelligence (B)                      | 39      |
| B3 011.1 | PTM: Low level of genteel sophistication (N)                | -39     |
| C3 003.2 | PTV: Uniform level of emotional stability (C)               | -35     |
| D8 016.2 | PTV: Uniform level of nervous tension (Q <sub>4</sub> )     | -34     |
| M6 342.2 | Dynamometer: Wide variability in level of shock performance | 34      |
| O6       | Group number  | 34      |

This is a fair match with Session 1, F7 (-) and Session 2, F9, but there is no triangle

### Factor 14

|          |   |     |
|----------|---|-----|
| M4 342.6 | Dynamometer: Little improvement with repetition of performance  | -50 |
| N4 386.4 | JJ: Suggestibility IV: Proportionately more time spent in reaching subsequent than original decisions | 47  |
| L2 300.1 | Construction: Rapid rate of completion  | -42 |
| F3 108.1 | SR: Few significant members   | -40 |
| K1 062.2 | Interests: Increase uniformity of preference strength   | 37  |
| N3 380.1 | JJ: Reach quick decisions   | -34 |
| M8 390.0 | TT: Few illegal throws made   | -33 |
| O7 108.7 | SR: Sociocenters for significant members  | -30 |

This factor has no match and is at present hard to interpret except as so sort of lack of morale, with suggestibility slow speed of construction, absence of learning in the stress situation and lack of a feeling that there are significant members.

# Factor 15

| Variable  | Descriptive Title  | Loading |
|-----------|--|---------|
| O5        | Random with N of 80                                      | 64      |
| M4 342.6  | Dynamometer: Uniform with practice while receiving shock | 53      |
| F6 250.1  | OR: Few leaders observed                                 | -50     |
| K5        | Card sorting: Speed increment (III-I)                    | -45     |
| L6 301.22 | Construction: Planning done for first trial              | -39     |
| O3 341.1  | Dynamometer: Low level of non-shock pull                 | -35     |
| L5 301.1  | Construction: Large amount of planning                   | 34      |
| M2 345.7  | Dynamometer: Little drop when shock added                | -32     |
| M8 390.6  | TT: Few illegal throws                                   | -31     |

Matches Session 1, F14 (-) and Session 2 F11 (-)

The data of this chapter is discussed in the next two chapters.

## CHAPTER VII

### Methodological Considerations in Determining the Nature of our Factors

Before attempting to define the dimensions which we think have emerged stably from this research, it is desirable to discuss methodological principles governing factor determination and meaning.

At this point in research we would not claim stability for factors unless they appear at least twice i.e. in two independent factorizations. It is true that this denies serious consideration of a factor which, by its very nature, changes pattern grossly from session to session, yet is very stable for the phase of neonateness concerned. Such factors probably exist in our findings, but entirely new researches with new populations on the same session or phase will be necessary before their stability can be established. We are thus compelled, until studies using the same variables as our own appear elsewhere, to restrict our findings, for the methodology does not exist to check our potentially wider findings in any other way.

The method of locating factors by simple structure is at present all we have available, and on a population of 80-100 cases as here it is not exact or unambiguous. It has elements of art as well as of science. Before this study was begun it was not even certain whether simple structure could be attained in data of this kind, though the studies on national culture patterns suggested it would be likely. The notion that in a group as in individuals, it is unlikely that a single factor will influence more than a minority of any widely chosen set of characteristics, seems borne out by our obtaining hyperplanes generally containing about 65% of the variables, as in earlier studies.

But although the principle may be sound its application in this case is rendered difficult by the hyperplanes being wider and harder to stabilize than in many individual studies. This experience may be due to being forced to take in the end only 80 groups, though, with other conditions sound, this number has proved a satisfactory minimum in some of our other studies. That it is not altogether satisfactory here is shown by our difficulty in getting unambiguous simple structure in about 15 rotations by the behavior of the random variables which we introduced as usual as an empirical check on our estimate of the standard error of a loading. In the first factorization the highest random loadings on seventeen factors were two in the twenties, one in the thirties and one of 0.41. Apart from the last factor extracted the distribution of two random variables in the 3rd session was similar. (a random worked for a half size population - 40 groups - reached 0.46.) It is evident that no loading of 0.40 or less is to be taken very seriously, and this makes the hyperplane woolly. Indeed in our last rotations we felt impelled in seeking correct hyperplanes to minimize loadings within  $\pm 0.15$  instead of  $\pm 0.10$  as is usually done.

The second reason for this unexpected wooliness of the hyperplanes is the low reliability which many of the group performances proved to have -- especially when it is calculated as a stability coefficient i.e. test-retest (see Table 9). This unreliability naturally tends to reduce factor loadings generally while increasing the prevalence of erratic loadings. There should be no attempt to generalize this statement about the prevalence of low reliabilities of all kinds -- even though common sense might suggest that groups in general would be less reliable than individuals -- excellent stability coefficients (10). It is evidently a

feature of the neonate group, for our findings below offer some indication that reliability and definiteness of factor structure increase even during three successive sessions of group life.

Before proceeding with the matching problem let us therefore digress for a brief space into a general examination of the reliability problems in regard to the variables in this research. The reliabilities of the individual tests are well known through other researches, as far as the 16 P. F., the attitude and interest tests are concerned. The coefficients of consistency for each form of the 16 Personality Factor test range from 0.50 to 0.88, and in a separate measure of coefficients of equivalents between the two forms they ranged from 0.61 to 0.93. Both forms were used in this test, so the personality factor measures for individuals reached a reasonably high level of reliability. Where group means for personality factors were used the agreement would naturally be still higher.

No measures were possible of the reliability of the interest tests, but the mean stability coefficient (test-retest, with lapse of one month) for the attitude tests was 0.51, (for individuals) and again would naturally be higher for groups.

The remaining reliabilities to be considered are those of group performances, observers' ratings of group structure, observers' interaction counts and sociometric ratings. The last alone lack definite conventional measures of reliability, but in this case each variable was in effect estimated twice by asking each question in two different ways<sup>1</sup>, their equivalence being tested by entering both into the factor analysis (first matrix).

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<sup>1</sup>For example the degree of felt acceptance was estimated by the question: "How free did you feel to bring up objections and partly formulated suggestions?" and "To what extent did you feel really accepted as a member in this group?"

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The agreement was very good as may be seen by glancing at the factor patterns (first matrix) for the items given in the example (37 and 38 in the matrix, the sign of the latter being reversed due to the direction of scoring).

The greatest interest naturally attaches to those reliabilities concerning which no study prior to this has ever been made, namely, the reliabilities of the performances of small groups. Here the principal interest is in the performance variables, though calculations have also been made for observers' ratings of structure and observers' ratings of interaction. Not all variables permitted both consistency and stability coefficients, but those obtainable are listed in Tables 8 (Consistency) and 9 (Stability).

Table 8

Reliabilities I: Consistency (split half) Coefficients.  
Consistency coefficients are available on ten tests only, since others could not be split.

(i) Dynamometer

| <u>Session 1</u> |       |                |       |
|------------------|-------|----------------|-------|
| Jerk Pull        | 0.564 | Sustained Pull | 0.469 |

Session 2

|                     |       |                      |       |
|---------------------|-------|----------------------|-------|
| Sustained non-shock |       |                      |       |
| shock               | 0.705 | Sustained Shock mean | 0.601 |
| Shock pull          |       |                      |       |
| (2 and 3)           | 0.752 | Shock pull (2 and 4) | 0.634 |

Session 3

|                     |       |                      |       |
|---------------------|-------|----------------------|-------|
| Sustained non-shock |       |                      |       |
| shock               | 0.725 | Sustained Shock mean | 0.758 |
| Shock pull          |       |                      |       |
| (2 and 3)           | 0.701 | Shock pull (2 and 4) | 0.730 |

(ii) Jury Judgment

Session 2

|           |       |  |  |
|-----------|-------|--|--|
| Authority |       |  |  |
| logic     | 0.447 |  |  |

Session 3

|           |       |  |  |
|-----------|-------|--|--|
| Authority |       |  |  |
| logic     | 0.398 |  |  |

(iii) Guessing Game

Session 1

|                   |       |                            |      |
|-------------------|-------|----------------------------|------|
| Questions 1 and 2 | 0.270 | Questions for "easy" items | 0.01 |
|                   |       | Questions for "hard" items | 0.32 |
|                   |       | Rate of questioning        | 0.19 |
|                   |       | Time for "easy" items      | 0.03 |

Session 2

|                   |       |  |  |
|-------------------|-------|--|--|
| Questions 1 and 2 | 0.151 |  |  |
|-------------------|-------|--|--|

Session 3

|                   |       |  |  |
|-------------------|-------|--|--|
| Questions 1 and 2 | 0.162 |  |  |
|-------------------|-------|--|--|

(iv) Construction

Session 1

|       |       |                           |      |
|-------|-------|---------------------------|------|
| Speed | 0.409 | Planning (time)           | 0.53 |
|       |       | Decrease in planning time | 0.34 |

Session 2

|       |       |  |  |
|-------|-------|--|--|
| Speed | 0.113 |  |  |
|-------|-------|--|--|



(v) Card Sorting

Session 1

Number of stacks correct 0.04

(vi) Discussions

Session 1

Speed of ranking 0.06

(vii) Group Judgment

Session 1

Speed of reaching decisions 0.24

(viii) Attitudes

Session 1

Quantity of change 0.04

Decrease in variance 0.18

(ix) Interests

Session 1

Decrease in variance 0.25

Inconsistency of decisions 0.08

(x) Observer Ratings (participation counts, jury judgment on all sessions)

Observers (M and S) 0.94

(V and M) 0.86

(C and S) 0.92

Breakdown according to type of interaction

a. Integrative (1, encourages; 2, relaxes; 3, agrees)

Interest 2 (M and S) 0.594 (V and M) 0.340 (C and S) 0.110

Jury Judgment (M and S) 0.587 (V and M) 0.364 (C and S) 0.249

b. Clarifying (4, leads by suggestion; 5, states wishes; 6, gives information)

Interest 2 (M and S) 0.679 (V and M) 0.756 (C and S) 0.747

Jury Judgment (M and S) 0.924 (V and M) 0.829 (C and S) 0.829

c. Asking (7, asks information; 8, asks others wishes; 9, asks guidance)

Interest 2 (M and S) 0.630 (V and M) 0.648 (C and S) 0.682

Jury Judgment (M and S) 0.729 (V and M) 0.901 (C and S) 0.777

d. Criticism (10, critical disapproval; 11, shows egoism; 12, leads by command)

Interest 2 (M and S) 0.403 (V and M) 0.386 (C and S) 0.515

Jury Judgment (M and S) 0.336 (V and M) 0.289 (C and S) 0.222

Breakdown according to type of variable

|                      |           |       |
|----------------------|-----------|-------|
| Interest I           | (M and S) | 0.795 |
| Discussion Situation | (M and S) | 0.827 |
| " "                  | (V and M) | 0.874 |
| " "                  | (C and S) | 0.838 |
| Group Judgment       | (M and S) | 0.766 |
| Jury Judgment        | (M and S) | 0.940 |
| " "                  | (V and M) | 0.863 |
| " "                  | (C and S) | 0.919 |
| Card Sorting         | (M and S) | 0.813 |
| Construction         | (M and S) | 0.424 |

It will be seen that these range lower than would be expected for individual traits and that they fall lower in the first session than in later sessions. The greatest variance, however, is between different types of performance, the group attitude and interest consistencies being conspicuously low, whereas such group performances as the Dynamometer and the Jury Judgment are tolerably good.

It is noteworthy that the consistencies of group interaction counts are decidedly high, but this coefficient differs from the true split half in being an agreement between two difference observers on the same period, rather than an agreement between two occasions for the same group. The observer agreement on more interpretive counts represented by "integrative" and "critical" responses is not so good as on simple "asking" and "clarifying" responses.

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The question arises as to whether some of the reliability in observer interaction count variables is spurious in the sense that it does not strictly belong to a specific category. For if an individual participates more in every way his "count" on a specific interaction category would tend to be higher even though observers were not in exact agreement in their concepts of the category.

This was tested by comparing the between subjects variance to the between categories variance, the ratio being significant at the 1% level.

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Test-retest coefficients represent a delay between two adjacent sessions of one to seven days and between first and third sessions of two to fourteen days. (The Navy groups met on consecutive days, the student groups on consecutive weeks, and the Air Force groups half on consecutive days and half every three days). It must be recognized that stability coefficients in general are of two kinds, those comparing a novel with a second experience and those comparing two "second" or stale experiences. In groups our impression is that the difference between a first and a second exposure to a test situation is peculiarly great, for there is a difference not only in knowing approaches to the problem but also in having developed modes of group organization to permit these approaches.

Table 9

Reliabilities II: Stability (Test-Retest) Coefficients

|                                      |                     |      |
|--------------------------------------|---------------------|------|
| 1. Target throw (Total throws)       | Sessions II and III | 0.19 |
| 2. Interests, Ranking                | " I and III         | 0.08 |
| 3. Interests, Voting                 | " I and III         | 0.55 |
| 4. Cryptograms, rate of solving      | " II and III        | 0.43 |
| 5. Card sorting, boxes right         | " I and III         | 0.31 |
| 6. " " time per box                  | " I and III         | 0.20 |
| 7. Dynamometer, sustained non-shock  | " II and III        | 0.32 |
| 8. Group judgment, score             | " I and II          | 0.34 |
| 9. " " time                          | " I and II          | 0.25 |
| 10. Guessing Game, number of guesses | " I and III         | 0.30 |
| 11. Jury Judgment, time, case 1      | " II and III        | 0.25 |
| 12. " " authoritative case           | " II and III        | 0.07 |
| 13. " " logic                        | " II and III        | 0.22 |
| 14. " " case 2                       | " II and III        | 0.28 |
| 15. Construction, time               | " I and II          | 0.25 |

In view of the above considerations it is perhaps not surprising that the stability coefficients fall decidedly below the consistency coefficients. The number and nature of the performances does not, however, permit us to confirm our hunch that the highest agreement would be between the second and third sessions and the lowest between the first and the third. Indeed, the stability is highest for some of the first and third relations and obviously depends much more on the nature of the performance than on the inter-session distance.

A good deal of further research needs to be done specifically on the change of reliability coefficients in groups with age and type of performance, but already we can say definitely that the stability coefficients are lower in neonate groups than for individuals and that there is some indication that the consistency coefficients are better in the third than the first session.

Returning now to the general issue of the amount of change and especially the change in structural stability and characteristics in proceeding from the first to the third session we shall seek evidence from other sources to add to that of the reliability coefficients. First we may ask whether the goodness of simple structure and the magnitude of the significant factor loadings increase as we move from session 1 to session 3. Although the tests for clarity of factor structure are not yet highly developed we shall apply the two most obvious ones, as follows: (a) the percentage of variables in the  $\pm 0.10$  hyperplane and (b) the total significant loading per factor, assuming that 0.30 roughly represents the lower level of significant loading (see (4)).

Corrections are necessary for the fact that the first matrix had 95 variables and 14 factors, the second 104 variables and 17 factors, the third 104 variables and 15 factors. The first is taken care of by the percentaging, the second by dropping the tail-end, lowest variance factors in each, leaving all with 13 factors apiece. The unequal reliabilities and natures of the variables can only be handled by the consideration that all three matrices are chance samples from a common pool of variables. The results are shown in Table 10.

Table 10

## Definiteness of Structure in Successive Sessions

|  | <u>Session 1</u> | <u>Session 2</u> | <u>Session 3</u> |
|--|------------------|------------------|------------------|
| Hyperplane Content   | 53%              | 60%              | 62%              |
| Sum of Significant Loadings<br>(total per factor for 13 factors) | 6.41             | 7.58             | 6.47             |

Although the significant loading trend is in the direction expected it is not continuous; but the hyperplane fit continuously improves from one to three. There is at least indication that factor structure is intrinsically clearer as the behavior of more matured groups is concerned.

(3) Lastly, in this examination of "age" trends, we have the finding, revealed below, that good factor matches were much easier to find between the second and third sessions (eight of them "triangles") than between the first and second (five "triangles"). The greatest difficulty was found between the first and third (four "triangles"). It would seem therefore (if vagaries of rotation are reasonably constant in the three sessions) that neighboring sessions are easier to match than remote ones, and that in the second and third sessions some greater constancy of structure is already emerging.

Our primary aim in the next chapter, therefore, is so to match factors that we may determine those of greatest stability persisting through the three sessions. Our secondary aim of discovering the nature of the changes, as a factor pattern persists from the first to the third session, can only lead in this initial research to observations at the level of "indications", though more general trends of the kind just rated may be more confidently recorded.

In the matching procedure shortly to be discussed it must be noted that 32 variables (the personality variables) out of the 80 or so variables in each correlation session are identical not only in nature but in their actual values for all three sessions, that is to say the population characteristics themselves remain the same because it is the same population in any one group in the three sessions. Consequently the correlations among these 32 personality measures also remain the same in the three matrices. Normally, if a factor analysis and rotation are carried out faultlessly, the factor loadings of these variables would remain the same on the three independent analyses -- except in so far as new variables bring them into entirely new factors. Our results indeed show very similar patterns for the personality variables on certain triads of factors in the three studies.

On the other hand it may be surmised that, unlike the usual situation, where the new variables in the matrix deal with the same individuals as do the old ones, the movement here from population to syntality variables (aspects of the same groups) creates a new structure which would not necessarily rotate to the same position as for population variables alone. The common factorization of syntality and population variables should in fact be followed by a further study in which they are factored and rotated independently). For example, it is conceivable that the same personality factors, or constellations of personality factors, in a population could generate (or be associated with) different group resultants (syntality characteristics) as the group ages and organizes itself.

One of the outstanding initial findings to emerge in Chapters IV, V, and VI is that population personality characteristics are the most highly loaded variables in certain factors describing groups. For example, in factors with final numbers 3, 5, 6, 8a and 9 in the following chapter the personality variables are clearly loaded above any other variables, to an extent that even a correction of the other loadings for attenuation by their lower reliabilities would scarcely correct. We have mooted in earlier theoretical writings the possibility of such determination of syntality by population. Now we can take up, in our final summary here, the question of whether, in neonate groups, before traditions are formed, the personalities of the component individuals are indeed more important than anything else in determining the group character. Before settling on this conclusion, one must examine the questions: (a) whether the reliabilities of these measures are higher than others, thus permitting their saturations to be higher, (b) whether the loadings on non-personality variables rise, relatively, as the group lives longer, as one would expect if this hypothesis is correct, (c) whether the factors in the personality variables themselves look like nothing more than second-order factors among first-order personality factors, just as they would occur among a population of individuals instead of a population of group populations.

Question (a) is answered by reference to Tables 8 and 9 above. The consistency coefficients of personality factors are not so much higher than those of group syntality variables that the latter could in general be brought up to the same level as the former by a correction for attenuation. In short, the personality variable predominance in some factors could be due to this cause, but we suspect that this is by no means the whole cause. The present discussion should be borne in mind in connection with the affect of attenuation in matching (Chapter VIII below).

Question (b) is answered by Table 11 wherein the total loadings on personality factors (above 40) are compared with those on other variables for the first three sessions.

Table 11

|                                  | <u>Session 1</u> | <u>Session 2</u> | <u>Session 3</u> |
|----------------------------------|------------------|------------------|------------------|
| Personality (Population Factors) | 55 (N22)         | 49 (N27)         | 49 (N20)         |
| Group Variables                  | 55 (N61)         | 52 (N74)         | 52 (N68)         |

There are thus at any rate indications that the characteristics of the group as such begin to emerge from those of the population as the group ages. With these observations on the relation of the personality factor constellations to other variable constellations we must return to ask what the personality constellations themselves may mean, and particularly to examine again our initial comment that they are likely to be second-order factors among groups to be the same as among individuals. The answer on theoretical grounds would seem to be that grouping people randomly and correlating means should lead to the same correlations as correlating the individuals (apart from sampling error). In actual fact the groupings of primary factors found here are quite similar to those found in two other studies with individuals.

However, even if we accept this inherent organization in the individual as responsible for certain of the group patterns it does not follow that these constellations truly correspond to second-order factors. They are more likely to be due in part to contamination of factor measures by items also involving

other factors, which stand out in the syntality variable constellation determining the rotation i.e. the factors, of the total set of variables. For example, high A and F together might produce certain marked sociability behavior, which would produce syntality emergents standing out as a factor pattern. Groups high in this syntality pattern would be those which happened in their original population endowment to possess the combination of high A and high F. This is obviously quite different from saying that a factor with A and F together is due to their mutual "contamination" as measures, or to even a second-order factor common to A and F -- for A and F need have no systematic association whatever in order to be "dragged into" this salient, self-defining group performance factor.

One argument in favor of this latter explanation is the frequent appearance of high loadings for group dispersion (i.e. the sigma), on some personality factor measurement within one of our syntality factors -- a result hardly to be expected from contamination or second-order factor effects. For nothing in the nature of a dispersion measure could appear in second-order factors as established on populations of individuals. The question as to whether this phenomenon therefore argues for an indisputable primacy of population variables in the factor structure does not permit of an easy or final answer here, but it does raise some new theoretical possibilities not envisaged before the discussion, chiefly that of the possible effects of population personality combinations. The conclusions to be drawn on the above issues, in so far as this first study permits conclusions, must depend on closer examination of the findings on loadings etc. for pair factors as set out in the next chapter.

In the matchings of factors from different sessions which are considered in the next chapter the ideal procedure would have been to begin with loadings corrected for attenuation by means of the consistency coefficients, but this was not possible as we had relatively few of the latter available. However, the possibility of certain of the loadings actually being much higher than those set out will be kept in mind in the final interpretation. Although the considerations of the above discussion have been kept in mind the matching procedure adopted has been an entirely objective one, comparing each factor in one session with every factor in the other on the basis of the loading pattern in the common variables rather than on any "feeling for the total sense of the factor" which would be a very subjective and deceptive criterion. Usually two or three factors in the second of the two sessions being compared, were found to have initial resemblances to one given factor in the first and examination of a lengthened series of variables was necessary to fasten on one factor match. This series of higher variables used for matching generally included the variables loaded above 30 in both factors, but since common variables were few it was often necessary to fall much below this.

In such cases the resemblance really rests, not on the magnitude of loadings as such (providing they exceed significance, which 0.30 does) but on the agreement of signs of loadings. To a first approximation a series of eight variables following the same sign pattern has an initial improbability of expressed by  $\frac{1}{2^7}$  i.e. there is only one chance in 128 of its happening without systematic cause. More precise formulae for matching have been worked out by the present writer elsewhere (4) taking into account the number of matchable variables from which the paired loading values are taken for examination of sign similarity; but these are excessively complex to apply at this point and the reader can more quickly evaluate the general degree of significance of the matches by the simpler criterion. There are also wider, common sense considerations, such as that the tentative acceptance of a match also depends on no other match being anywhere near the same probability value. Finally, when matches were made on the above grounds, without reading the meaning of the variables, the matches were subse-

quently tested by examination of similarity of the meaning among the non-common variables. The stable factors for all three sessions, attained by these examinations, will now be studied.

## CHAPTER VIII

### Nature of the Group Dimensions found stable in Two or More Sessions

The present chapter will restrict itself to those fourteen of the above listed twenty-three matches which can be most confidently discerned. We will look at the "pairs" first and the "triads" last. The objective matching procedure described in the last chapter was carried out in both directions -- looking for significant loadings in the 1st series like Factor X in the 2nd series, looking in the 2nd series for a pattern like Factor Y's high variables in the 1st series (when Y has been the preliminary match for X). Since the high loadings of a factor would in any case regress in passing to a new sample we never expected the second pattern to be as high as the first. Thus X's pattern is in general reduced in Y and Y's in X, but no other factors in general have the sign-pattern of the high variables of X and Y.

In the first and second sessions we have:

Factor 13 on Session 1 and 17 (Reversed) on Session 2, the following being the only variables with appreciable loadings on either factor.

#### Final Number 7

| Index |       |   | <u>I : 13</u> | <u>II : 17 (-)</u> |
|-------|-------|---|---------------|--------------------|
| 27D3  | 011.2 | PTV: High variance in genteel sophistication (N)  | 30            | 60                 |
| 26D2  | 010.2 | PTV: High variance on bohemian aggressiveness (M) | 47            | 36                 |
| 25D1  | 009.2 | PTV: High variance on paranoid suspiciousness (L) | 54            | 31                 |
| 49H1  | 370.1 | Discussion: High speed of ranking alternatives    | 41            | 24                 |
| 24CS  | 008.2 | PTV: High variance on emotional sensitivity (I)   | 62            | 21                 |
| 34K2  | 107.7 | SR: High number of negative effectors             | 38            | -10                |
| 09B2  | 009.1 | PTM: Mean on bohemian aggressiveness (M)          | 15*           | 38                 |

\*There is one exception to the statement (Chapter II) that the 32 personality factors measures were common to all three sessions. The measure of M mean failed in session 1 due to clerical errors, so this loading is not to be taken as reliable.

In addition there are indications of high inconstancy of planning in the construction task and high development of leadership technique. Variables with some loading on one but not enough on the other are: - Poor strength of sustained dynamometer pull, dislike of attitude discussion situation, small increment of sustained pull, little modification of altitudes and little immediate shock decrement on dynamometer.

This factor has been interpreted as one of Frustration through Temperamental Heterogeneity in the Group, favoring sense of conflict, dislike of discussion, necessity for inexact leadership technique and rather poor performances generally.



Final Number 8

| Index |       |                                      | <u>I : 12</u> | <u>II : 13 (-)</u> |
|-------|-------|--------------------------------------|---------------|--------------------|
| 04A4  | 004.1 | PTM: High level of dominance (E)     | 38            | 42                 |
| 28D4  | 012.2 | PTV: High variance on anxiety (O)    | 19            | 44                 |
| 54F8  | 310.1 | Low accuracy of group judgment       | -29           | -10                |
| 77E5  | 205.1 | OR: High freedom of group atmosphere | 40            | 10                 |

There are also indications of small increase of homogeneity of attitudes, little modification of attitudes, dislike of the group judgment test, little sense of personal rejection, dislike of attitude discussion situation, good performance on the electrified rope pull and poor performance on card sorting.

This factor is best interpreted as a consequence of high mean dominance. There is much individuality and freedom, good performance where simple fortitude is required but poor performance where care and close organization is demanded. Individuals dislike group discussion and modify their attitudes little.

Factor 11 in session 1 with 10 (reversed) in session 2 is also a tolerable match, but as its meaning cannot at present be intelligibly discussed in brief it will not be set out here and the reader is referred to the tables.

In the first and third sessions we have:

Final Number 8a

| Index |       |   | <u>I : 7-8</u> | <u>III : 5 (-)</u> |
|-------|-------|---|----------------|--------------------|
| 05A5  | 005.1 | PFM: High level of surgency (F)                   | 30             | 40                 |
| 07A7  | 007.1 | PFM: High level of adventurous<br>cyclothymia (H) | 30             | 25                 |
| 52L5  | 301.1 | Construction: High amount of<br>planning          | 25             | 40                 |
| 08A8  | 008.1 | PTM: Low score on emotional<br>sensitivity (I)    | -20            | -46                |
| 11B3  | 011.1 | PTM: High score on genteel<br>sophistication (N)  | 30             | 41                 |
| 79G7  | 207.1 | OR: Low degree of frustration                     | -25            | -13                |
| 47K7  | 360.0 | Card Sorting: Number right                        | 40             | -11                |
| 77G5  | 205.1 | OR: Low freedom of group atmosphere               | -09            | -09                |
| 82F6  | 250.1 | OR: Few leaders observed                          | -08            | -41                |

In addition to these common variables there were in Factor 5 (-) low time saving score on cryptograms (-56); low suggestibility in jury judgment (-52); in Factor 7-8, high preference for group judgment, high dynamometer sustained pull, high number right in card sorting, and low (obs. rating) level of group frustration.

This factor has been called, before, Democratic Savoir Faire and High Verbal Interaction. It is government by the many and with free discussion, as opposed to a single leader with little discussion. The association with high mean surgency of disposition is so marked as to suggest that this is the root cause of the difference.

|       |        | <u>Final Number 12</u>                       |     | <u>I : 9</u> | <u>III : 6</u> |
|-------|--------|--|-----|--------------|----------------|
| Index |        |  |     |              |                |
| 46L1  | 332a.1 | Guessing Game: Long time on easy items       | 17  |              | 57             |
| 87J7  | 352.71 | Interests: Inconsistency of decisions        | -81 |              | -16            |
| 43K8  | 331a.1 | Guessing Game: Many questions on easy items  | 21  |              | 37             |
| 82F6  | 250.1  | OR: Many leaders observed                    | 05  |              | 55             |
| 08A8  | 008.1  | PTM: High level of emotional sensitivity (I) | 30  |              | -03            |
| 41E4  | 125.1  | SR: Low group unity                          | -08 |              | -31            |

The above loadings are few because few of the high loaded items happened to be common available items to both sessions. The high items in the non-common were, on F9: Little concentration of preferences in the Interests situation (-87), Low speed of ranking in the Interests situation (-59) and Dislike of card sorting (-43), and in F6; High (speed of decision) suggestibility on Jury Judgment (59), consistency of suggestibility (59) and large volume of argumentation in Jury Judgment (49) and high observer rating of interpersonal conflict.

The term "Fecklessness" was suggested earlier for this factor. It expresses a group inclined to endless chatter, with no sense of urgency, speed, or point, no organization and no liking for organized effort, but friendly. There is marked suggestibility.

In the second and third session we have:

Session 2. Factor 3 and Session 3, Factor 5

|      |       | <u>Final Number 8b</u>                                |     | <u>II : 3</u> | <u>III : 5</u> |
|------|-------|---|-----|---------------|----------------|
|      |       |   |     |               |                |
| I3N2 | 385.0 | Jury Judgment: Low suggestibility                     | 49  |               | 52             |
| A8A8 | 008.1 | PTM: High level of emotional sensitivity (I)          | 05  |               | 46             |
| B3B3 | 011.1 | PTM: Low level of genteel sophistication (N)          | -58 |               | -41            |
| A5A5 | 005.1 | PTM: Low level of surgency (F)                        | -33 |               | -40            |
| H3N3 | 380.1 | Jury Judgment: High volume of argumentation           | 64  |               | 28             |
| H602 | 381.1 | Jury Judgment: High suggestibility I: Much discussion | 63  |               | 24             |

The match is good here, though A8 is negligible in one manifestation of the factor. High non-common variables, extending the possible meaning of the factor, are, on F3, Jury Judgment, suggestibility (2) (52), Construction, high amount of planning (48), Low mean score on PFA and G. On F5 there is high time saving score on cryptograms and high number of leaders observed.

This factor has a resemblance to factors (Final numbers) 5 and 8a and marked resemblance to Final number 6 and it will be debated later whether 6, 9 and 10 should be run together.

Second session Factor 4, Third session Factor 4 (Reversed)

Final Number 9

|       |       |  | <u>II : 4</u> | <u>III : 4(-)</u> |
|-------|-------|--|---------------|-------------------|
| B6B8  | 016.1 | PTM: High mean on nervous tension<br>(Q <sub>4</sub> ) | 62            | 65                |
| B4B4  | 012.1 | PTM: High mean on anxiety (O)                          | 51            | 60                |
| B2B22 | 010.1 | PTM: High mean on bohemianism (M)                      | 51            | 58                |
| A8A8  | 008.1 | PTM: High mean on emotional<br>sensitivity (I)         | 23            | 53                |
| J1M1  | 342.1 | Dynamometer: Poor performance on<br>shock pull         | -10           | -46               |
| A7A7  | 007.1 | PTM: Low mean score on<br>adventurous cyclothymia (H)  | -09           | -50               |
| B1B1  | 009.1 | PTM: High mean score on<br>paranoid suspiciousness (L) | 13            | 50                |

The loadings here are substantial and the match clear. The non-common variables carried in on the separate factors are, on F4 (session 2) Discussion: high rank of attitude situation (63), Discussion, high preference for verbal over motor activities (61) Discussion; dislike of construction (-44). On F4 (session 3) Low mean PFQ3 (will control) (-48), Low mean PFC (Emotional stability) (-45) and long time on easy questions in guessing game (43).

This factor is evidently strongly determined by personality factors, indeed perhaps essentially by the level of the Q<sub>4</sub> or Nervous Tension. Groups having a high mean on this and its associated projections on other "Neuroticism" measures show poor morale in the stress (electrified rope) performance, avoidance of construction in favor of verbal activities and a difficulty in making good coordinated judgments (guessing game). It is a factor of "Morale".

Session 2, F14, Session 3 F8

Final Number 10

|      |        |  | <u>II : 14</u> | <u>III : 8</u> |
|------|--------|--|----------------|----------------|
| I6M5 | 345.71 | Dynamometer: Large immediate<br>decrement on<br>shock performance  | 52             | 68             |
| I7M2 | 345.7  | Dynamometer: Large mean decrement<br>on shock performance          | 37             | 65             |
| H8N5 | 387.4  | Jury Judgment: More consideration<br>given authority than<br>logic | -47            | -43            |
| E7G7 | 207.1  | OR: Low degree of group<br>frustration                             | 02             | -41            |
| H3N3 | 380.1  | Jury Judgment: short period of<br>argumentation                    | -48            | -11            |
| K8F2 | 112.1  | SR: Formal leader has little<br>influence                          | -45            | 07             |

This match limps with respect to K8F2 but is still far beyond the fit obtainable with any other factors, for either of these factors. Non-common "highs" are, on F14, low variance on PFL (Paranoia) (-51), many candidates on first ballot for leader (45), Jury Judgment, small unanimity on original decision (-44), Low satisfaction with leader (-44), Low index of group participation (-43) and high subjectivity reported freedom to participate (41). On F8 we find high level of non-shock pull (56) and short total time in getting to the end of the guessing game (-45). Its interpretation will be discussed later.

Session 2, Factor 6 and Session 3 Factor 6,

Final Number 11

|       |        |  | <u>II : 6</u> | <u>III : 6</u> |
|-------|--------|--|---------------|----------------|
| H602  | 381.1  | Jury Judgment: Much discussion of E's arguments                      | 52            | 59             |
| I2 N6 | 381.2  | Jury Judgment: Little variation in time spent on different arguments | -05           | 59             |
| H3N3  | 380.1  | Jury Judgment: Much discussion before reaching original decisions    | 10            | 49             |
| F3J3  | 211.1  | OR: Much impersonal conflict   | -33           | -30            |
| M2L2  | 300.1  | Construction: Rapid rate of completion                               | -79           | -11            |
| E7G7  | 207.1  | OR: High degree of frustration                                       | 76            | 26             |
| M1L3  | 302.33 | Construction: Little change in level of aspiration                   | -46           | -22            |
| A6A6  | 006.1  | PTM: High level of character integration (G)                         | .52           | 05             |

This is apart from the last item, a very good match and has the following "imports" from non-common variables. On F6 (sessions 2) High optimism of aspiration on the Dynamometer (35) and low proportion of goal directed activity (-32). On F6 (session 3) Long time in guessing game on each item (57), High number of common leaders (51); large number of questions guessing game (37), Low group unity (-31) and low rate of questioning (-29).

The picture is one of slowness like in verbal and non-verbal performances through deliberate, inhibited behavior. The deliberateness, thoroughness, rigidity of aspiration, freedom from interpersonal conflict but sense of frustration over group purposes could most readily be explained by the high mean character factor (G) of the group, though in view of its low loading one is more inclined in this case to view the factor as a syntality pattern per se.

We now come to the more satisfying instances where A in Session 1 is found to match B in Session 2, B is found to match C in Session 3 and C is found to match A. It should be emphasized that in these "triads" the three matches have been found independently and their joining in a complete triangle is therefore additional evidence of the goodness of matches.

Triad S1 F2, S2 F1, S3 F1.

Final Number 2

| I  | II | III |       |   | <u>I : 2</u> | <u>II : 1</u> | <u>III : 1</u> |
|----|----|-----|-------|---|--------------|---------------|----------------|
| 75 | E3 | G3  | 203.1 | OR: High degree of leadership             | 68           | 52            | 73             |
| 73 | E1 | G1  | 201.1 | OR: High degree of group organization     | 42           | 61            | 66             |
| 80 | E8 | G8  | 208.1 | OR: High degree of interdependence        | 31           | 53            | 58             |
| 78 | E6 | G6  | 206.1 | OR: High degree of we-feeling             | 50           | 66            | 51             |
| 76 | E4 | G4  | 204.1 | OR: High orderliness of procedure         | 53           | 46            | 49             |
| 02 | A2 | A2  | 002.1 | PTM: High mean on intelligence (B)        | 24           | 31            | 46             |
| 93 | F5 | J5  | 213.1 | OR: Much explicit concern with procedure  | 25           | 56            | 68             |
| 09 | B1 | B1  | 009.1 | PTM: Low mean on suspiciousness (L)       | -85          | -05           | -13            |
| 79 | E7 | G7  | 207.1 | OR: Low degree of frustration             | -53          | 01            | -04            |
| 92 | F1 | J1  | 209.1 | OR: High strength of motivation           | 46           | 71            | 33             |
| 77 | E5 | G5  | 205.1 | OR: High freedom of group atmosphere      | 08           | 48            | 04             |
| 71 | G3 |     | 341.1 | Dynamometer: High level of non-shock pull | 40           | 64            |                |
| 03 | A3 | A3  | 003.1 | PTM: High mean on emotional maturity (C)  | 47           | 23            | -06            |

It is surprising to have so many available common items in the higher loaded items of three factorizations -- only one item is missing on one factor. The agreement among these in sign and significance is excellent in all but three of the 13 items available. High items among non-common variables are: on S1 F2 Low mean PF Factor Q<sub>4</sub> (nervous tension (-49)), Low mean PF Factor O (anxiety) (-46), on S2 F1. High (Obs Rat) tension energy level (64); on S3 F1, High sociometric rating on number of significant members (42) and High level electrified dynamometer pull (40).

It might seem that so many OR variables together could be an artifact due to halo (through different states of benignness in the observer, or different observers). Possibly this exists, but it is not the whole story because (a) leadership, organization and orderliness stand out from the other equally "approved" ratings and (b) objective test and sociometric ratings also appear and these are of a kind likely to result from such group structure and motivation (c) personality factor measures are also involved and they too concur with the results (intelligence, stability, trustful cyclothance). This factor has been already hypothesized to be "Immediate High Synergy" resulting from the personality qualities.

Triad S1 F5 (-) S2 F2 and S3 F2

Final Number 1

| I  | II | III |       |                                       | <u>I : 5(-)</u> | <u>II : 2</u> | <u>III : 2</u> |
|----|----|-----|-------|---------------------------------------|-----------------|---------------|----------------|
| 41 | J8 | E4  | 125.1 | SR: High group unity                  | 82              | 55            | 81             |
|    | L1 | F1  | 116.1 | SR: High satisfaction with leader     |                 | 82            | 78             |
|    | K8 | F2  | 114.1 | SR: High influence with formal leader |                 | 60            | 70             |

|    |    |    |        |  |     |     |        |
|----|----|----|--------|--|-----|-----|--------|
|    | L2 | E7 | 129.1  | SR: High morale following dynamometer        |     | 29  | 54     |
| 37 | K1 | E3 | 118.1  | SR: High feeling of freedom to participate   | -35 | -29 | -43    |
| 80 | E8 | G8 | 208.1  | OR: High degree of inter-dependence          | 30  | 10  | (-402) |
| 53 | F6 | L6 | 301.22 | Construction: Most planning done for trial 2 | 03  | -49 | 07     |
| 34 | K2 | E2 | 107.1  | SR: Small number of negative effectors       | 02  | -03 | -52    |
|    | A1 | A1 | 001.1  | PTM: Low mean on friendly cyclothymia (A)    | -04 | -42 | -12    |

The last three or four variables exhibit poorer consistency but the match is tolerably good. The variables not available even to two sessions which are high in these factors are: on S1 F5, the sociometric ratings high satisfaction with overall efficiency (70). High optimism for group's future (59), High enjoyment (54), High commonness of purpose (52), High feeling of being accepted (49), High optimism of aspiration for dynamometer sustained pull (34) and High dynamometer jerking pull (31). On S2 F2 we find satisfaction with leader (overall) (63); High expressive-malintegrative behavior index (50), High IGA for personal acceptance (47), High rating as to excellence of decisions reached (44) and Feeling of approval toward the current session (42). On S3 F2 we find sociometric ratings Helpfulness of designated leader (74), satisfaction with group conformity (56), Felt importance of experience (52), small number of socio-centers for rejection (08:-42).

This factor was interpreted when it appeared in Session 1 only as "High Intrinsic Synergy" i.e. high amount of energy generated by the gregarious (intrinsic) and other direct satisfactions of the group. For it is noticeable that while this factor is strongly connected with both observer and sociometric ratings of group unity, satisfaction, and interaction it does not in fact produce much performance except low loadings on sustained and jerk (coordinated) dynamometer pull. It is noticeable also that personality factor measures (except A) play practically no role, so this factor must be some self-developing syntality characteristic, unless a strong argument can be made for the A loading being artificially low.

Triad S1 F1(-), S2, F12(-) and S3, F12.

|    |    |     |       | <u>Final Number 3</u>  |              |                |                 |
|----|----|-----|-------|--|--------------|----------------|-----------------|
| I  | II | III |       |  | <u>I : 1</u> | <u>II : 12</u> | <u>III : 12</u> |
| 07 | A7 | A7  | 007.1 | PTM: High mean on adventurous cyclothymia (H)                | 66           | 45             | 56              |
| 04 | A4 | A4  | 004.1 | PTM: High mean on dominance (E)                              | 51           | 34             | 47              |
| 05 | A5 | A5  | 005.1 | PTM: High mean on surgency (F)                               | 26           | 44             | 47              |
| 15 | B7 | B7  | 015.1 | PTM: High mean on will control (Q <sub>2</sub> )             | 63           | -01            | 35              |
| 06 | A6 | A6  | 006.1 | PTM: High mean on positive character (G)                     | 62           | 10             | 37              |
| 03 | A3 | A3  | 003.1 | PTM: High mean on emotional stability (C)                    | 21           | 43             | 38              |
| 48 |    | K6  | 361.1 | High speed on card sorting game                              | 03           | -              | -39             |
|    | H8 | N5  | 387.4 | Jury Judgment: More consideration given authority than logic | -            | 00             | -40             |

|    |    |       |   |    |    |     |
|----|----|-------|---|----|----|-----|
| K6 | F3 | 108.1 | SR: Small number of significant members   | 03 | 01 | -37 |
| 71 | G3 | 341.1 | Dynamometer: High level of non-shock pull | 02 | 44 | -   |

There are fewer available common elements here and the examination has had to include lower loadings, which may account for some of the decline in goodness of matching, though some improvement of rotation is also indicated as required. In non-common variables the imported loadings are, on F1. High level of dynamometer jerking pull (68), Dislike of group judgment activity (-65), Preference for Dynamometer 61; Low PFO (-46) and sociometric rating High commonness of purpose (40) on S2 F12 Low rate of production of cryptogram solutions (-35), low suggestibility 4 (-32) and suggestions of low leadership, speedy group judgments and more interpersonal conflicts. On S3 F12 there is only Low satisfaction with group conformity (-40).

Triad S1 F6, S2 F7 (-) and S3 F7 (-)

|    |    |     |        | <u>Final Number 5</u>  |       |           |            |
|----|----|-----|--------|--|-------|-----------|------------|
| I  | II | III |        |  | I : 6 | II : 7(-) | III : 7(-) |
| 01 | A1 | A1  | 001.1  | PTM: High mean on friendly cyclothymia (A)                         | 51    | 26        | 39         |
| 09 | B1 | B1  | 009.1  | PTM: Low mean on paranoid suspiciousness (L)                       | -06   | -46       | -37        |
|    | G2 | M8  | 390.0  | Target throw: Small number of illegal throws                       |       | -44       | -36        |
|    | H6 | 02  | 381.1  | Jury Judgment: Much time spent discussing experimentors arguments  |       | 40        | 30         |
| 04 | A4 | A4  | 004.1  | PTM: High mean on dominance (E)                                    | 06    | 46        | 29         |
| 54 | F8 |     | 310.1  | Group Judgment: High accuracy                                      | 45    | 25        |            |
| 21 | C5 | C5  | 005.2  | PTV: High variance on surgency(F)                                  | 50    | 01        | 06         |
| 29 | D5 | D5  | 013.2  | PTV: (Questionable) high variance or radicalious (Q <sub>1</sub> ) | 50    | -10       | -09        |
| 60 | M1 | L3  | 302.33 | Construction: (Questionable) Inconsistency of aspiration           | -40   | 28        | 22         |

There is an unfortunate absence of available common markers at key points in this triad and the match of 6 with the two 7's is not as good as their mutual match. Further research must be done on the best simple structure position of F6.

The factor is primarily one of cyclothymia of personality, with freedom especially from paranoid schizoid trends. This is associated with accuracy in group judgments (freedom from prejudices) and fairness on the target throw but with susceptibility to immediate emotional appeals on the jury judgment. This response to emotional appeals rather than to crooked thinking is typical of the cyclothyme as contrasted with the schizothyme. The factor was called earlier, as sketched in Wispe's study (9) Intelligent Role Interaction -vs- Low Morale I. Important non-common high loaded variables are: in F6 High variance on F1, Q<sub>1</sub> H and G, High mean on Q<sub>1</sub> (Radicalism) (38) and B (Intelligence) (36), and small amount of planning on construction (-35) and good coordination on jerking pull (35). On S2 F7 Preference for cryptogram performance (39). On S3 F7 High rate of production of cryptograms and small volume of questions on difficult guessing game items (-30). It is this "intelligent" mutual coordination, with

absence of internal friction and good resultant group intellectual effectiveness which caused Cattell and Wispe to call it Morale I (9).

Triad S1 F14(-), S2 F11(-), S3 F15

| <u>Final Number 4</u> |    |     |        |   | <u>I : 14(-) II : 11(-) III : 15</u> |     |     |
|-----------------------|----|-----|--------|---|--------------------------------------|-----|-----|
| I                     | II | III |        |   |                                      |     |     |
|                       | F6 | L6  | 301.22 | Construction: Most planning done for trial two                        | -50                                  | -41 | -39 |
| 52                    | F7 | L5  | 301.1  | Construction: Much planning time                                      | 61                                   | 09  | 34  |
|                       | I5 | M4  | 342.6  | Dynamometer: (shock) much improvement with practice                   |                                      | 14  | 53  |
|                       | I7 | M2  | 345.7  | Dynamometer: Little decrement when shock added                        |                                      | -30 | -32 |
|                       | H7 | N4  | 386.4  | Jury Judgment: Spend more time on 1st decisions than in E's arguments |                                      | -46 | 02  |
|                       | J1 | M1  | 342.1  | Dynamometer: High mean level of electrified pull                      |                                      | 40  | 14  |
| 44                    |    | K2  | 331b.1 | Guessing Game: Many questions on difficult items                      | 36                                   |     | 12  |
| 82                    | F6 |     | 250.1  | OR: Few common leaders  | -02                                  |     | -50 |
|                       | E2 | G2  | 202.1  | OR: Leadership technique is authoritarian                             | 06                                   | -37 | -08 |
| 55                    | G1 |     | 311.1  | Group Judgment: Slow speed of reaching decision                       | 47                                   | 04  |     |

Again there is no great number of common available variables among the higher loadings on any of the factors, but among the ten which exist five are good and three more correct as to sign. If we may fall back on that questionable evidence "general meaning" it gives additional matching in the sense of a "fortitude morale" opposed to "taking it easy". Non-common high variables are: On F14, large variance on PFC (Emotional Maturity), slow speed of completion on construction. On F11, Preference for motor rather than verbal activities (45), Low consistency of suggestibility (-39), High morale rating following the dynamometer (33), Small number of leadership ballots for election (-32), Low cheating score (-30). On F15 little speed increment on card sorting (-45), Low level of dynamometer non-shock pull (-35), and small number of dots on the target throw.

The overall meaning is much like that of the "Fortitude morale" factor in Cattell and Wispe's pilot study (9) i.e. fortitude and good performance in shock, plodding concentration on construction and difficult questions, better toleration of motor and calculating tasks instead of preference for easy verbal activities, integrity in cheating situations and insusceptibility to suggestion. There is a kind of masculine, dour morale here as opposed to preference for verbal activities, (but without systematic internal communication) and lack of ability to face stress.

Triad S1 F7 (+) S23 (-) and S3 F5 13(-)



Final Number 6

| I  | II | III |       |  | <u>I : 7(-)</u> | <u>II : 3</u> | <u>III : 5.13*</u> |
|----|----|-----|-------|--|-----------------|---------------|--------------------|
| 11 | B3 | B3  | 011.1 | PTM: High mean on genteel sophistication (N)                           | +30             | +58           | +40                |
|    | G2 | M8  | 390.0 | Target Throw: Few illegal throws made                                  |                 | -23           | -30                |
| 52 | F7 | L5  | 301.1 | Construction: Time devoted to planning                                 | -03             | -48           | -46                |
| 04 | A3 | A3  | 004.1 | PTM: High mean on paranoid suspiciousness (L)                          | +29             | +09           | +38                |
|    | 13 | N2  | 385.0 | Jury Judgment: High suggestibility; shift decision after few arguments |                 | -49           | -31                |
| 31 | D7 | D7  | 007.2 | PTV: High variance on will control (C <sub>3</sub> )                   | +34             | +25           | +33                |
|    | F1 | J1  | 209.1 | OR: High motivation  | +02             | +01           | +25                |
| 25 | D1 | D1  | 009.2 | PTV: High variance on paranoid suspiciousness (L)                      | +01             | +33           | +36                |
|    | H3 | N3  | 380.1 | Jury Judgment: Small volume of argumentation                           |                 | -64           | -11                |
|    | H6 | 02  | 381.1 | Jury Judgment: Spend short time with E's arguments                     |                 | -63           | -13                |
| 18 | C2 | C2  | 002.2 | PTV: Low variance on intelligence (B)                                  | -36             | -25           | -12                |
| 79 | E7 | G7  | 207.1 | OR: Low degree of frustration  | -45             | -10           | -02                |
| 07 | A7 | A7  | 007.1 | PTM: High mean on adventurous cyclothymia (H)                          | -05             | +45           | +12                |
| 08 | A8 | A8  | 008.1 | PTM: Low mean on emotional sensitivity (I)                             | -05             | -05           | -33                |

\*The values in this column are the mean of  $F^{III}_5$  and  $F^{III}_{13}$

This sixth and last triad case be considered seriously only if we accept a notation to a new vector between F3 and F5 not yet set out in the rotated factor matrix and yielding projections mid-way between as shown in our third rotated column. One discordant variable G4, F7, L5 then exists and three where appreciable loading in one has only a weak loading in another.

Contributed by non-common variables we have, on F7, many right in card sorting task (+76), card sorting, low speed of completion (-43); on F3, Jury Judgment low suggestibility 2 (-57) and low suggestibility 3 (-49), Little planning in construction (-48), Dislike for group judgment (-42). On F5 and F13 we find low time saving score on cryptograms (-20), High (soc. rat.) satisfaction with co-workers (+36), Many sociocenters of friendship (+20) but low satisfaction (soc. rat.) with group conformity (-30).

This factor had formerly been called "Democratic Savoir Faire -vs- Lack of Self-Possession" and the main features of this character are still more brought out by the present additions. The groups high on this factor know how to run a group happily and well. They like one another, waste little time in argument or formal planning, are insuggestible, unfrustrated, and accurate in tasks requiring reliable cooperation. The high loading in PFN "Genteel Sophistication" agrees extremely well with the flavor of the factor as described in the earlier study (9) before personality measures were used, and may indicate that such educated personalities are the source of the group behavior described in this pattern.

## CHAPTER IX

### Possible Origins of Syntality Dimensions

Here we open to wider discussion the problem of the nature of the discovered neonate group dimensions. But before entering on discussions let us first list and label, in convenient condensed form for ready reference, the factors from the previous chapter which seem to us of greatest stability, mainly because of firm repetition of pattern from session to session. That the labels may sometimes be cumbersome is less important than that they should retain the maximum descriptive reference, whereby they may be held correctly in mind and without prejudice during this interpretive phase of research. We shall list them in rough descending order of their clarity and stability, as follows:-

1. High Synergy through Leadership -vs- Disintegrative Low Morale (S1F5(-), S2F2, S3F2). This marks high satisfaction with the group and with the leader, associated with good dynamometer performance in the sustained and the coordinated (jerk) pull. It's earlier manifestation was labeled "High Intrinsic Synergy". It is essentially interest in the group's existence and purpose.
2. High Immediate Synergy through Personalities -vs- Low Intrinsic Synergy (S1F2, S2F1, S3F1) High motivation, we-feeling, and leadership arising in connection with low mean paranoid and higher mean intelligence and emotional maturity in the group, apparently causing quicker growth of group synergy, per se. This kind of synergy has been defined elsewhere as intrinsic synergy.
3. Adventurous Forcefulness of Population -vs- Individual Insight (S1F1E, S2F12(-) S3F13. This is largely a "personality of population" factor on H, +, F, +, G, + and E, + but brings in suggestions of horde dominance, preference for and goodness at group 'athletic' performance with dislike of and poorness at crypts and low individuality in discussions.
4. Plodding, Fortitudinous Morale -vs- Irresponsible Verbality (S1F14E, S2F11E, S3F15). There is much plodding planning (but little useless verbiage) and outstanding morale on shock and difficult situations. Performance is slow. (Cromwell's Rump Parliament.)
5. Intellectually Effective Cyclothyme Role Interaction -vs- Low Morale I (S1F6, S2F7(-), S3, F7(-)). Predominantly high cyclothymia, high dominance, low paranoid and some high intelligence with high accuracy of group judgment, high lability and emotional suggestibility, and general excellence on group intellectual activities, especially those of unspoken coordination.
6. Sophisticated Democratic Determination -vs- Lack of Group Self Possession (S1F7, S2F3(-), S3F(5.B)(-)). High score on the personality factor of sophistication and some positive score on paranoia, goes with low suggestibility, determined, quick and sometimes effective behavior, (e.g. on card sorting, construction, jury,) and with good morale, motivation and friendly lack of internal frustration. (Formerly called Democratic Savoir Faire).
7. Frustration through Temperamental Heterogeneity (S1F13, S2F17(-)). High variance in several personality factors (N, M, L, I) and high mean of M associated with internal dislike, need for leadership techniques, and rigidity of individual attitudes. (Sess. 1 and 2)

8. Frustration of group through High Dominance (S1F12, S2F13(-)). High mean population dominance and high variance in anxiety goes with low accuracy in group judgment and a dislike of group life (Akin to that in 7, but good fortitude). (Sess. 1 and 2).

The two following factors 8a and 8b may be segregated as temporary alternative resolutions to the single factor 6.

8a. Surgent Democratic Communicativeness (S1F7.8, S3F5(-)). High surgency (F and H) of population, with much free discussion and planning by the many, low frustration and a tendency to effectiveness e.g., in sustained pull and card sorting. (Sess. 1 and 3) This factor, inverted, has some resemblance in population traits to the following, with which it may ultimately prove to be identified, as surmised in 7 above.

8b. Unsophisticated Suggestible Palaver (S2F3, S3F5). This factor connects suggestibility and argumentation (also long planning) with low population mean on N and F (and high on I). (Sess. 2 and 3)

9. Garrulous Nervous Emotionality -vs- Morale of Effort (S2F4, S3F4(-)). Predominantly a factor of population nervous emotionality ( $Q_4$ , O) and also sensitivity (M, I,  $Q_3$ -, C-) this is associated with preference for verbal activities and poor performance in the shock situation and situation of brief decision. (Sess. 2 and 3)

10. Indifference or Low Group Synergy -vs- High Reward Morale (Morale VI) A very well defined factor. (S2F14, S3F8). Little argumentation or time in getting to a solution, little unanimity, little satisfaction with group or leader, small fortitude in electric shock, but little sense of frustration. (Sess. 2 and 3)

11. Slow, Rigid, Unintegrated Deliberation with Frustration (S2F6, S3F6). Prolonged deliberation, questioning and construction, with a sense of general frustration, misdirection and a lack of unity, but without personal conflict. A tendency to group constancy and rigidity. Some loading in positive character (Personality factor G). (Sess. 2 and 3)

12. Low Organization -vs- Sense of Purpose (S1F9, S3F6). Lengthy ineffectiveness in the guessing game, long pointless argumentation, high suggestibility and low group unity are associated somewhat with high personality mean on source trait I, (Sensitivity) (Sess. 1 and 3)

In addition to the above matched factors the following, though found only on one session, is worthy of record:

13. Unanimity on the Leader (S2F9). A unanimity on the elected leader, with few candidates per ballot is found with preference for verbal (over motor) activities and with poor motivation and energy-tension level.

In what frame of reference can we now seek hypotheses about the above fifteen dimensions? First, let us keep in mind that the individual differences of groups, like those found among individual persons can spring either from influences inherent at birth or from environmental influences. The fact that at least seven of the above thirteen factors --2, 3, 5, 6, 7, 8 and 9-- have large loadings (generally the largest loadings) in population personality measures, suggests

that inherent influences have here been of predominant importance. This indicates two questions as follows:

1. Is it indeed possible to conceive of any influences other than "natal" ones that could have been active in causing individual differences in these groups, since, by the intention of the experiment, their environments were identical (as to test situations, incentives, etc.) during the nine hours of life granted to them?

2. If we are truly investigating "dimensions of groups" should we not have arranged for more environmental variation to occur and more individual group history to accumulate before making our tests?

For the sake of perspective on the intentions of our enquiry and consequently of the present analysis, we shall answer the second question first. The one great difference which exists between research on the dimensions of groups and of individuals is that the former belong to far many more different species. The task of finding dimensions has to be undertaken with the recognition that it must deliberately set out first to distinguish its species and then to study each separately. As a point of commencement we decided to chose the neonate, face-to-face, male adult-group (of ten persons) first because the budget of this pioneer research was not of a magnitude to pursue groups through their aging process and secondly because most research on the dynamics of small groups--for which our research on dimensions is needed--also deal with groups of only a few hours duration.

Even so we shall argue--with five of our thirteen dimensions as general evidence--that even in the first nine hours of life some differences due to environment can occur. It spite of our keeping, the test situations constant the following differences of environment (including incentive) could occur:

(a) Some groups performed later in the day than others or nearer to a meal. That is, there would be fatigue and energy differences. Factors 10 and 12 have characteristics which could fit such an origin.

(b) Some populations of groups could differ from others in characteristics, chiefly situational, other than those covered in our definition of the population, i.e. in our extensive measuring of personality. For example, they might happen to be less well off and thus more strongly motivated in the group situation by our standard \$100.00 prize. Again, students could regard the group work as a recreation and military men as an extra duty, and so on. Some tests were done in pleasant rooms, others in wooden huts, some in winter, some in summer, and so on. Factors 1, 4, 10, and 12 might be of this nature. To check on origins of factors through 1 and 2 would require more variables to be correlated in that area than we have yet worked upon.

(c) Initial experiences of a quite trivial nature--so trivial and uncontrollable as to be normally describable as "accidental"--might, in the case of groups, set up a rapid spiral of change--a positive feed-back-- unknown in individuals. The "luck" of one or two initial successes might generate an increased interest in the group which would in turn facilitate further successes and so bring out a pattern of high synergy such as that in Factor 1. Perhaps one of the most important of the "trivial" uncontrolled circumstances was the duration of intervals among the three sessions of the groups. No true identification of such an influence with a factor is possible without further specific research.

(d) Additional to the above three considerations of true environment is a form of semi-environmental influence which is peculiar to groups, and which we would prefer logically to consider a new category of "natal-structural influence" but which some psychologists might justifiably include in "environment". We refer to structural and combinatory effects among given natal elements. The unquestionably "natal" elements as far as a group is concerned are the personalities of the individual population members as measured before they come together in a group. But when they come together "chance" may throw two particular persons in physical contiguity, or a premature judgment may make one a leader, and at once his personality weights the group performance more than the other given personalities. This is the powerful effect of structure and, unless we insist on a doctrinaire view that structure is wholly determined by the inherent, given nature of the convened personalities, we have to admit that structure is something beyond the given, "natal" population characteristics per se.

Incidentally, structure, so readily definable as a third panel after population and syntality (5) (6) is here ambiguous at times, or grades imperceptibly into syntality characters. For the variance (or sigma) of a group is also a characteristic of structure, but this is unquestionably given in the group before birth. It is noteworthy that we have one factor -7 above- which seems to be a function of such high variance or heterogeneity of members.

The second "semi-environmental" -perhaps strictly "maturational" influence to be considered is that which arises from certain combinations of personalities within a group. Like variance this is "given", but it is perhaps better described as relational than structural, for it is independent of and prior to the formation of roles and role relations in the members. However, presumably from certain combinations of personality qualities e.g. of low N with low F, as in Factor 8b, or high mean dominance with high variance in anxiety, as in Factor 8, certain group effects could arise which are not functions of either in isolation. These hypothesized effects we shall call "population relational emergents".

Now we can return to the question raised earlier as to the meaning of the clusters of personality factors found in such group dimension factors as 2, 3, 5, 6, 8, and 9 above. There are four possibilities:--

1. They are second-order factors, precisely the same as we should find if we correlated primary personality factors for individuals instead of groups.

2. They are "contamination factors" i.e. essentially first-order personality factors dragging in loadings on other factors to the extent that the items for the first personality factor are generally somewhat "contaminated" with loadings in other factors. These, like second-order factors, also would presumably arise in the same form and magnitude with populations of groups as with populations of persons.

3. They are sampling error factors, due to systematic sampling "contamination", instead of to test contamination. Our subjects were drawn from different social classes and callings. In so far as some callings select combinations of factors such combinations would appear in our results. Unlike effects 1 and 2 above, which would operate despite groups being entirely chance samples, this effect would arise only when all the members of a group come from one class, and our testing orders, such that all groups at one place were Navy men and all at another Air Force men, could produce such effects.

4. The personality factors appear together because they produce peculiar "relational emergents" in the group variables as discussed above. If the simple structure is imposed, in the subsequent rotations, by the configuration of the latter which predominate numerically among the variables, factor patterns could appear in the former different from those which would appear only in populations of persons.

We do not have all the information necessary to decide among these. It is most important, indeed, for throwing light on important methodological and theoretical questions that further analysis should be done on our data, factoring and rotating the personality factor measures (a) for the population of persons as such, and, (b) for groups as such, and (c) for the syntality variables without the personality variables (on groups, of course).

Meanwhile we can rule out alternative (1) as unlikely, because the personality measures are known to be to some extent contaminated, and pure measures would be required to pass directly and clearly to second-order factors. The effect of (3) would be recognizable to the extent that we know how O.C.S. candidates, students and navy recruits are selected, and have data on the levels of these three population groups in the various factors. One could conceive that the factors involving intelligence notably 2 and 5 might distinguish the students, but they do not look particularly student-like, and we shall contingently doubt this alternative, thus centering the discussion on effects 2 and 4.

Effect 2 might be recognized, in the absence of the more certain evidence from further analyses, first by the definite presence (or absence) of similarity of psychological meaning in the personality factors found in the clusters forming the present group factors and secondly by any one personality factor being only really highly loaded in one of our present factors. The first condition is obviously met in our factors 3, 6, and 9. Reference to conditions (2) shows that they have their highest loadings respectively in personality factors H, N, Q<sub>4</sub>, and their secondary loadings in (F, E, C), (B), and (O, M, I) (also Q<sub>3</sub> and C-) respectively. All of these, but particularly the last, show some degree of family resemblance within the groups, as this effect requires. The secondary loadings are high enough for us to doubt sometimes if condition 2 is well met, but this may be due to the inevitable looseness of simple structure. Turning to glance at all factors we note that factor A, at least, is high in factor 1 and nowhere else, while factor 8 is outstanding high in E, and factor 2 uniquely loaded in B (Intelligence). One can see also a prominence in 7 of M, in 11 of G, and in 12 of L. Thus, if one seeks "syntality factor-personality factor" matches it is possible to find tolerable identifications in all measured personality factors except C, O, Q<sub>1</sub>, Q<sub>2</sub>, and Q<sub>3</sub>.

The simplest interpretation of the majority of the discovered dimensions, therefore, is that they are of the nature of (2) above i. e. that they are, initially, essentially factors in population characteristics corresponding to factors in individual personality. They thus carry with them the lower loadings on related personality factors, and, furthermore, presumably produce individually the attendant group syntality variable effects as seen in factors 1, 2, 3, 5, 6, 7, 9, 11, and 12.

To illustrate how an individual personality factor could produce a set of syntality effects let us consider Factor 1, where the constellation of group unity, satisfaction with the leader and small number of negative effectors could arise from the good natured, easy-goingness and sociable warmth of factor A (cyclothymia). In 2 the immediate high synergy could be the result of higher

intelligence leading to quicker perception of the group as an instrument. But in both of these and in most others the loading in the supposed causal influence is low enough to permit at this stage entertainment of alternative explanations.

In 3, however, the high loading in H certainly leaves little doubt that the high level of dynamometer pull is a consequence of the boisterousness of H+ and F+ factors. Similarly the suggestibility and "instinctive" group cooperation of factor 5 probably arise from the cyclothymic sociability A+ and L-. In 6 the low group suggestibility and small argumentation are likely to be derived from the shrewdness and sophistication of N. In 8a the freedom of atmosphere, low frustration and long planning discussions could arise from the gaiety and talkativeness of the surgency factor. And in 9 the poor performance in the electrified pull, the preference for verbal over performance situations and the excess of time on easy items almost certainly derive from the neurotic disabilities of Q<sub>4</sub>. Similar population personality connections can be seen in factors 7, 11, and 12. However, even where the outstanding loading of the population measure indicates its primacy, the resulting group phenomena may still differ from the individual phenomena as cumulative effects differ from simple ones.

Turning now to the theory of relational emergents we may choose, first, factor 2, combining high intelligence with high emotional stability and low paranoia. This has been discussed above as a possible single resultant of intelligence but is almost certainly better explained as a relational emergent from the socially facilitating combination of these "desirable" traits, producing high immediate synergy. Again Factor 8 combines high dominance with large variance in anxiety (O), the second presumably making the first especially intolerable and leading to avoidance of group life and low accuracy in group decisions. Factors 6, 8, and 8b show the combination of high F and high N with low I, in almost equal apparent loadings, (8a and 8b are alternative solutions to 6) but the effects are different, apparently, through high H also being in the first. Although this has been mentioned above as a possible second-order or contamination resultant, there is no good reason from previously observed individual correlations to suppose that it is. The combination seems a very good one, on a priori psychological grounds, for it insures good group interaction, by means of F+ and H+, without the suggestibility and sentimentality which would result from N- and I-, i.e. from lack of shrewdness.

Psychologically, it is easily seen that relational emergents could appear as resultants, powerfully generated by certain personality combinations, but it may not be so clear as to how these combinations themselves can arise statistically, by chance. Let us therefore consider just three elements, each of which can have a significant value plus or minus. There are now four possible clusters, which could occur with equal frequency. ((A+, B-, C-) (A-, B+, C-) (A-, B-, C+) and (A+, B+, C+)). If one of these, however, is more potent in producing group emergents, it could succeed in giving the added variance to syntality traits which would create a factor. We should expect, however, that these factors would be harder to find as the number of combinatory elements increases, for only a minority of the groups could differ from the mean in respect to this uncommon combination, i.e. in regard to deviations on resultant syntality traits, and this minority gets smaller (relative to all other possible combinations) as more combinatory elements become involved.

In summary we shall settle on the following tentative conclusions and hypotheses about the nature and origin of the present fourteen or fifteen syntality factors.

Factors obtained by factoring groups appear to consist of:--

(1) Syntality factors where the high saturation of population personality factors and particularly a single factor, create the presumption that the group qualities follow from the personality qualities. There are four, or possibly six of these in this study: viz: 3(H), 5(A), 6(N), 9(Q<sub>4</sub>) and possibly 8a(F) and 2(B).

(2) Syntality factors where an even but high loading in population factors not obviously related in character suggests that a combination of personality factors has the capacity to produce marked group effects, producing a syntality factor through relational emergents. There are certainly three and possibly four of these, viz: 2(B+, C+, L-), 5(E+, O high variance), 8b (N-, F-, I+) and possibly 8a(F+, N+, I+, H+).

(3) Syntality factors where the group performances are correlated with population variance (structural) conditions. The only clear example of this is 7 (High variance on N, L, M and I).

(4) Syntality factors where no population traits have any marked loadings and where the factor must be due to "natal" conditions not measured by personality factors e.g., student or military training, or "accidental" structural developments or to situational differences, such as differences in fatigue, spacing of meetings and motivation. There are five or possibly six, of these, viz: 1, 4, 10, 12, 13 and possibly 11.

The first of these "environmental" factors is almost certainly the factor representing the results of good leadership. This would not be expected to show itself in population mean data, even if it resided in pre-natal population endowments (for the leader's qualities are lost in the group average) though it might be expected to show in some variance on personality, but none is conspicuous in loadings. Factor 4 (Plodding, Fortitudinous Morale) is at present inexplicable, though it is very clear in all three sessions and appeared also in our pilot study. Could it be that some early experiences quickly generate a feeling of security in some groups and not in others? Factor 10 is most readily explained as a factor of motivation strength through situational setting, presumably because the reward meant more to some subjects than others on account of their social situation. Factor 12 strongly suggests the results of fatigue, an hypothesis which could be checked by correlation with time of day of sessions. Factor 13 is apparently the "accident" of a single personality, very much as in Factor 1, though here the person is not necessarily a good leader but only someone with such attractive presence that he creates high unanimity in choosing him as a leader in the initial contacts.

Factor 11 appears to be intermediate in origin between this and the first of our classes. It combines deliberation, frustration (but no internal aggression) and some loading on character factor Q<sub>3</sub> (will control). Our hypothesis is that the high Q<sub>3</sub> initially sets high standards of aspiration, by which the group is frustrated, but this very frustration, by reason of the high will control, in turn produces more deliberation and inhibition, instead of mutual conflict.

The practical consequences and further theoretical investigations following from these results and hypotheses are summarized in Chapter XII.



## Chapter X

### The Findings on Leaders and Leadership Procedures

Elsewhere (6) it has been demonstrated that a "leader" is basically to be defined and evaluated in either of two ways:--(1) By a formula involving only the structural features of the group, such as are derivable from sociometric counts of modes of contact, managerial and obedience channels or popularity votes, and (2) By measures of the relative influence of individuals on total syntality or syntality change i. e. by taking that individual as the leader who can be demonstrated to have greatest influence on group performance, regardless of his "internal" status in the group.

The greater ease of application of the first formula, and the lesser effort required to understand it, have resulted in its being hitherto the only method of leadership assessment. They will doubtless result in its offering considerable resistance to replacement by the more objective and predictively important formulation.

In this study we have for the first time measurements on group syntality which would permit us to measure and investigate leadership in the new terms. However, since support for this project was granted on the assumption that it was a study only of measurement of group dimensions, our man-hour resources did not permit exploitation of the radical possibilities which we had indicated that our design would be likely to create secondarily in relation to leadership measurement, group structural relations to performance etc. A properly completed analysis from this point on would relate the 16 personality factor profiles of leaders to:--

- (a) The profiles of non-leaders, defined (1) structurally i. e. interactionally  
(2) by syntality

- (b) High and low endowment of the led groups on each of the syntality factors now measurable i. e. to the characters of the groups in which persons of the given personality profile tend to become leaders.

- (c) Similarly, high and low possession, by the groups, of various structural, sociometric and population characters.

- (d) The history of the leader in terms of increasing and decreasing (1) syntality effects (2) popularity and structural effects, throughout the three sessions.

- (e) The use of various leadership methods and techniques (seen through interaction analysis data) by leaders having the various personality endowments.

- (f) The rate of group learning, especially in consciously desired directions of change, associated with various leader profiles.

- (g) Characteristics of deposed (not re-elected) and undeposed leaders. This breakdown should include an examination of the second session syntality matrix (in which four opportunities for deposition occurred) for group factors connected with high leadership turnover.

The present chapter, however, must be largely confined for the reasons given, to (a), i.e. to setting out and discussing the personality differences found between leaders and non-leaders, and in this we have to adhere to the first formula for a "leader". Actually we had several sources of evidence on leadership and some e.g. the picking out of leaders by external observers, transcend a little the purely sociometric restriction. The data which could have been used are contained in variables 17, 18, 19, 20, 22, 23, 66 and 96 in Table 13. Actually we have analyzed below three of the most important of these possible variables:-

18. Times in Leader Role. The number of times the individual was perceived and agreed upon by all observers as the single person who had shown most leadership in a temporary situation. (Master List 251)

19. Leadership Election. Based on the records of actually being elected to leadership, which meant in fact that the individual was the formal leader for at least part of the leader life of the group. (Master List 413)

66. Frequency of Leadership Acts (rank). Rank in the group based on the total number of situations, in the course of three sessions, where the observers had rated the subject as showing some leadership. (Master List 250)

The above data is not analyzed for the whole 1000 cases but includes only the military subjects (the Navy and Air Force, excluding the students, who were a minority) and only the cases gathered in the second year of the study<sup>1</sup>.

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This sample was used because the relationship between the identification number assigned the group, and the number assigned the individual member was such that it was possible by a purely mechanical process to make translations from the number by which other members knew a subject to study identification number, if that subject, for example, the person who wore the arm band bearing a 1 in group 100 was given the study identification number 1001. In the case of earlier groups, where the group and individual numbers were not completely systematically related it proved to be an extremely time consuming task to relate sociometric and observer rating data (identified by only the group number and the short individual number -1 to 10) to the study identification subject number.

The general formula by which a systematic relationship may be maintained between group and individual numbering systems is  $(G_{No} \times N_G) + K = \text{Subject number}$ , where  $G_{No}$  is the number assigned the group,  $N_G$  the number of people in the largest group in the series, and  $K$  is the within-group subject identification number, running from 1 to  $N$ , or from 0 to  $(N-1)$ .

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It will be recalled that leadership elections were held first at the end of session I, then three times during the course of session II, and again at the end of session II. Thus the person elected at session I could never have functioned unless he was re-elected later; the three elected for the course of session II faced different problems and the one elected at the end of session II served throughout session III. No consideration has as yet been given to the varying circumstances of the election or re-election, thus the criterion of leadership used here was simply being elected at least once. Using this criterion, we had 92<sup>1</sup> leaders and 233 non-leaders on which complete personality data was available<sup>1</sup>.

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<sup>1</sup>Note that the second year military population consisted of 20 Navy Recruit groups and 14 Air Force O.C.S. groups.

In Table 12 we (as a critical ratio in relation to differences) have set out the means, the differences, and, in required cases, the standard deviations for each personality factor for leaders as selected by each of the above criteria and for the accompanying followers i.e. the populations after the leaders are extracted

Table 12

Personality Differences of Leaders and Non-leaders

| Personality Factor | 18. OBSERVERS' LEADERS |       |      |      | 19. ELECTED LEADERS |       |      |      |
|--------------------|------------------------|-------|------|------|---------------------|-------|------|------|
|                    | L                      | Non-L | d    | C.R. | L                   | Non-L | d    | C.R. |
| A                  | 18.3                   | 19.7  | -1.4 | -    | 18.6                | 17.4  | 1.2  |      |
| B                  | 12.5                   | 11.7  | 0.8  | -    | 10.9                | 10.3  | .6   |      |
| C                  | 36.1                   | 34.2  | 1.9  | 2.2  | 34.8                | 34.0  | .8   |      |
| E                  | 27.0                   | 26.0  | 1.0  | -    | 25.2                | 24.4  | .8   |      |
| F                  | 26.1                   | 26.2  | -0.1 | -    | 26.4                | 22.5  | 3.9  | 4.6  |
| G                  | 22.4                   | 21.3  | 1.1  | 1.5  | 22.4                | 20.8  | 1.6  | 3.6  |
| H                  | 39.8                   | 35.8  | 4.0  | 3.4  | 36.6                | 33.2  | 3.4  | 3.2  |
| I                  | 9.8                    | 10.6  | -0.8 | -    | 10.0                | 10.6  | -.6  |      |
| L                  | 16.8                   | 17.8  | -1.0 | -    | 17.9                | 18.6  | -.7  |      |
| M                  | 18.6                   | 19.8  | -0.8 | -    | 18.6                | 20.2  | -1.6 | 2.5  |
| N                  | 23.0                   | 22.2  | 0.8  | -    | 21.4                | 20.7  | .7   |      |
| O                  | 11.3                   | 13.6  | -2.3 | 2.4  | 13.0                | 15.9  | -2.9 | 2.7  |
| Q <sub>1</sub>     | 21.5                   | 21.2  | 0.3  |      | 19.7                | 19.8  | .1   |      |
| Q <sub>2</sub>     | 15.9                   | 14.5  | 1.4  |      | 13.6                | 14.6  | -1.0 |      |
| Q <sub>3</sub>     | 26.7                   | 24.6  | 2.1  | 2.2  | 26.0                | 23.6  | 2.4  | 2.1  |
| Q <sub>4</sub>     | 12.0                   | 15.0  | 3.0  | 2.2  | 14.7                | 16.0  | -1.3 | 1.4  |
| N                  | 43                     | 100   |      |      | 92                  | 233   |      |      |

66. FREQUENCY LEADERSHIP ACTS

| Personality Factor | High L'ship | Mid L'ship | Low L'ship | d <sub>1</sub><br>(H-L) | (H-M) | d <sub>2</sub><br>(H-L) |
|--------------------|-------------|------------|------------|-------------------------|-------|-------------------------|
| A                  | 17.8        | 17.9       | 17.5       | 0.3                     | -0.1  |                         |
| B                  | 11.4        | 10.4       | 9.7        | 1.7                     | 1.0   | 4.2                     |
| C                  | 35.1        | 34.1       | 33.6       | 1.5                     | 1.0   |                         |
| E                  | 25.6        | 24.4       | 24.0       | 1.6                     | 1.2   |                         |
| F                  | 26.9        | 25.6       | 25.0       | 1.9                     | 1.3   | 2.5                     |
| G                  | 22.1        | 21.0       | 20.6       | 1.5                     | 1.1   | 3.1                     |
| H                  | 36.7        | 33.3       | 32.9       | 3.8                     | 3.4   | 3.1                     |
| I                  | 9.8         | 10.7       | 10.7       | -0.9                    | -0.9  |                         |
| L                  | 18.1        | 18.6       | 18.4       | -0.3                    | -0.5  |                         |
| M                  | 19.0        | 20.1       | 20.1       | -1.1                    | -1.1  |                         |
| N                  | 21.9        | 20.4       | 20.6       | 1.3                     | 1.5   |                         |
| O                  | 13.3        | 15.4       | 16.2       | -2.9                    | -2.1  | 2.2                     |
| Q <sub>1</sub>     | 19.9        | 20.3       | 18.8       | 1.1                     | -0.4  |                         |
| Q <sub>2</sub>     | 14.1        | 14.1       | 14.1       | 0.6                     | 0.0   |                         |
| Q <sub>3</sub>     | 25.8        | 24.3       | 23.2       | 2.6                     | 1.5   | 3.4                     |
| Q <sub>4</sub>     | 14.7        | 16.3       | 16.4       | -1.7                    | -1.6  | 1.4                     |
| N                  | 90          | 140        | 90         |                         |       |                         |

18. Two observers agreed at least once out of 15 possible times that "L" was the "principle leader" in a situation.  
Population: AF subjects tested in year 2.
19. "L" was elected leader by group vote at least one time.  
Population: AF and Navy recruit subjects tested in year 2.
66. Rank in group on the basis of the number of times two observers noted the member to show leadership in the course of three sessions.  
Population: AF and Navy recruit subjects tested in year 2.

It will be seen at once that a number of differences exist which are significant at the 5% (C.R. = 1.96) and at the 1% level (C.R. = 2.58) and that there is a tendency for the same differences to be significant for the various kinds of leadership criterion i.e. there is convergence of evidence from the three independent ways of selecting leaders.

On all three leadership selection methods leaders are higher than non-leaders on:--

|                      |  |
|----------------------|--|
| Factor B             | Intelligence   |
| " C                  | Emotional maturity                                   |
| " E                  | Dominance  |
| " G                  | Character integration                                |
| " H                  | Adventurous cyclothymia                              |
| " I (-)              | Hard headed practicality                             |
| " M(-)               | Practical concernedness                              |
| " N                  | Polished fastidiousness                              |
| " O(-)               | Absence of being worrying and anxious (free anxiety) |
| " Q <sub>3</sub>     | Deliberate will-control                              |
| " Q <sub>4</sub> (-) | Absence of nervous tension (somatic anxiety)         |

Significance of difference at the 5% level, or more, is found on all three leadership selection methods simultaneously for:--

1. Adventurous cyclothymia (H+)
2. (Absence of) Worrying suspicious anxiety (O-)
3. Deliberate will-control (Q<sub>3</sub>+)
  - (4. Integrated character (G+),<sup>3</sup> which, however, falls down slightly, on one of the three methods)

Considering the elected leader category as being the most substantial and widely applicable criterion, we find the following differences at significant values:--

1. Surgency (F+)
2. Positive character integration (G+)
3. Adventurous cyclothymia (H+)
4. (Absence of) worrying suspicious anxiety (O-)
5. Practical concernedness (not Bohemian aggressiveness) (M-)
6. Deliberate will-control (Q<sub>3</sub>+) )

From what has been established about the nature of these personality factors in personality research generally, it is comparatively easy to see why these particular dimensions of personality should have such significant relations with leadership.

In regard to the three most consistently differentiating factors--H, O and Q<sub>3</sub>--which are generally near or well beyond the 1% level of certainty, the explanation is clear enough. The timid, withdrawn schizoid behavior of H- would certainly not permit leadership. The "anxious worrying" pattern of O+ would not inspire confidence in others. The absence of the will characters and organizational precision associated with Q<sub>3</sub> would not permit a person of otherwise suitable temperament to see his decisions through and organize the group with consistency and planfulness.

It is noticeable that a slightly greater significance of differences attaches to the "elected leaders" category, suggesting that this is perhaps the most reliable designation of a leader, through frequency of leadership acts runs it very closely. The elected leader category differs from the others--which come nearer to being a definition of the leader in syntality terms rather than socio-metrically--in the high weight it gives to surgency. In catching the limelight and holding it, as the elected leader needs to do, the surgency factor is evidently of very great importance.

On the other hand the experienced observer, trying to distinguish the person who actually leads and influences the group syntality, regardless of the group's perception of the fact, picks out those higher on emotional stability (C factor) to a degree not found by the other methods.

Completing our comments on what is peculiar to each mode of leadership selection we should note that leadership in terms of actual acts of group direction and re-direction has relatively strong weighting in Q<sub>3</sub> and a totally higher level of general intelligence, B. Intelligence should clearly favor that "technical" leadership which shows in readier solution of the group's problems (as of any problems even though the individual who accomplishes this real leadership is not accepted by the group as a recognized (or elected) leader because of absence of certain other personality characteristics.

Proceeding to differences of lesser significance which are nevertheless consistent for all kinds of leadership we note that integrated character (G) strongly favors leadership, presumably for the obvious reasons: that Nervous Tension (Q<sub>4</sub>-Psychosomatic anxiety) militates fairly strongly against it, and that Dominance (E) is only slightly associated. The last finding is a fitting confirmation of the view expressed by the present writers earlier on theoretical grounds: viz: that many writings identifying leadership with authority, domination and authoritarianism are grossly over-simplified and prejudiced.

The differences of pattern for the different criteria of leadership, few though they seem to be, are yet statistically significant and psychologically very suggestive of hypotheses for special study. They suggest that the definition of leadership by syntality change tends to pick out effective personality qualities-- Intelligence (B), Character Integration (G) and Deliberate will-control (Q<sub>3</sub>)--to a degree not found by the sociometric definition. If problem-solving is the leader's important function it would seem that some machinery needs to be invented for making such leaders sociometrically acceptable despite absence of surgency (F), which latter, so useful in electioneering, could conceivably detract from real service to the group (as seen in Observers' estimate).

The further statistical analyses of our results into differentiating the qualities which get leadership and those which retain it has not been possible on our resources, nor has it been possible to work out the results in correlation form such as would permit construction of a multiple regression equation for the

prediction of leadership. However, there seems little doubt that with so many statistically significant independent factor relations to the criterion there should be a high multiple correlation with leadership obtainable from the Sixteen Personality Factor Questionnaire, and the following is suggested as a practicable formula, estimated from the variance differences.

$$\text{Performance Leadership } = P_L = .2B + .2C + .1E + .4F + .4G + .4H - .1I - .2M + .1N - .4O + .4Q_3 - .2Q_4$$

Where the factors are measured in standard scores (or as point scores derived therefrom) as given in the Sixteen Personality Factor Test Handbook (6a).

## CHAPTER XI

### Determinants of Individual Behavior, Attitude Change, etc.

It is our intention to summarize here some data which is in some ways miscellaneous but which may nevertheless be substantially conceived under the rubric of the effects of groups upon individuals.

The chief data on the behavior of individuals, to be considered here is that recorded by the interaction process "check counts" by the observers, as well as that resulting from a special study by Dr. Stice on attitudes.

A comprehensive and realistic set of categories in Interaction Process analysis observation is the first necessity for sound work in this area. Our preliminary experiments carried an initially invented set of comprehensive categories through various mutations, but eventually we settled on 16 and we were gratified to observe, when Dr. Bales' Interaction Process Analysis appeared, a year after we started, (1948), that some twelve to fourteen of our categories could be considered identical with his, though independent in origin.

These interaction processes--which cover behavioral interaction--have been set out in appendix Table I.C.II, with sufficient immediate description of their nature. Nevertheless, a few words may be desirable here on the choice of categories, the mode of observation, the reliabilities and the statistical method of making frequencies comparable.

The observations in group behavior which have to do with individual relation patterns, and out of which influences as to structure have to be fashioned are classifiable, in our schema, as follows:-

1. Interaction Behavior (a) Communication
  - (i) Conscious, Verbal,
  - (ii) Unconscious etc.(b) Other interactions
2. Sociometric: Evidence on ergic needs in terms of attitudes to other individuals, introspectively determined i.e. not from actual group interaction process.
3. Perceptual: Expectant data, obtained from introspective evidence concerning what each expects (realistically) from others

This use of sociometric is more specific than in older studies and the greater part of our structural evidence is interactional. It will be noted that 2 is distinguished from 3, though both are founded on subjective report data, by being concerned with what the individual wants not what he expects. For the great majority of "sociometric" data have this character of being (a) subjective and (b) concerned with desired affiliations or rejections.

As stated in the account of general experimental procedure, each individual in the group had a colored arm band by which he was recognized. This same arm band he put on at each of the sessions. Two observers sat in separation from the group recording certain comments on interactions. Our own schema of classification, as stated above had four extra categories of interaction which could not in any way be reduced within the 14 categories already simultaneously existing in Bales' study, though the remainder of our categories lined

up very well with his. (The extra four may result from the deliberately highly varied situations to which we exposed our groups) Accordingly we modified our first 14 categories slightly to include some behavior observed by him in his corresponding categories but not previously admitted in ours, and we retained our four additional categories to his. The form on which this data was collected together with the manual of instructions for its use are set out in appendix I(C)II.

Table 13

DESCRIPTION OF INDIVIDUAL BEHAVIOR VARIABLES  
IN THE GROUP SITUATIONS CORRELATED WITH  
PERSONALITY MEASURES IN TABLE 14

1. - 16 Individual scores on 16 P.F. (001 to 016)<sup>1</sup>
17. Leadership I: Number of times at least one observer felt leadership was shown. (252)
18. Leadership II: Number of times two observers agreed that the subject was the principle or most important leader in a situation. (253)
19. Leadership III: Number of times the subject was           ted leader. (413)
20. Leadership IV: Number of sociometric votes as leader in the Construction situation. (113)
21. Leadership V: Number of sociometric votes in Target Throw Situation. (113)
22. Leadership VI: Sociometric choices in "action situations" (combination of 20 and 21) (113)
23. Leadership VII: Sociometric report at end of session III of who had been leaders in the course of the three meetings. (112)
24. Sociotelic Selection I. Action situations in session I. The number of votes received by each person in 3 situations where each person is permitted two votes each time. (100)
25. Sociotelic Selection II. Verbal situations in session I, as above. (100)
26. Sociotelic Section III. Action situations session III. (100)
27. \_\_\_\_\_ IV. Verbal situations session III. (100)
30. Sociotelic Selection V. Number of votes received by each person at end of session I. Unlimited number of choices. (101)
31. \_\_\_\_\_ VI. as 30 for Session II. (101)
32. \_\_\_\_\_ VII. as 30 for session III. (101)

<sup>1</sup>See table 7, Chapter III, the master list, for a complete description of the variables listed in this table. The final number listed after each variable here is the identification number for that table.



33. Sociotelic rejection I. Number of rejections received by each person at end of session I. (102)
34. \_\_\_\_\_ II. As 33 for session II. (102)
35. \_\_\_\_\_ III. As 33 for session III. (102)
36. Effective speakers. Number of votes received as an effective speaker. (103)
37. Ineffective speakers. As for 36 above using this criteria. (104)
38. Significant Contributor; Number of votes received as a significant contributor to the task of the group. (105)
39. Significant Contributor, T.T.: Number of votes received in the target throw situation. (105)
40. Significant hinders. Number of votes received as being "more of a hinderance than a help". (106)
42. Negative effector. Verbal situation. Number of tabs as slowing group by their presence. (107)
43. Negative effectors II. Action situations. (107)
44. Significant member. Number of tabs received as having made a significant contribution to the group. (108)
45. Psychotelic selection I. Session I. (109)
46. \_\_\_\_\_ II. Session III. (109)
47. Satisfaction with leader I. (Session II, Action situations). (116)
48. \_\_\_\_\_ III. (Session III) (116)
49. Satisfaction with leader in card sorting III. (110)
50. Percentage of total participation in Jury Judgment (Session II)<sup>2</sup>
51. Rank in group on basis of total number of participations. (260)
52. Percentage of S's remarks falling category A. (Social emotional positive remarks). (261)
53. Number of S's remarks falling in category A.
54. Percentage of S's remarks falling in category B. (Task oriented answers and solutions). (261)
55. Number of S's remarks falling in category B.
56. Percentage of S's remarks falling in category C. (Task oriented questions) (261)

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<sup>2</sup>Data for variables 50 through 65 was all based upon the Jury Judgment situation for Session II only.

57. Number of S's remarks falling in category C.
58. Percentage of S's remarks falling in Category D. (Social-emotional negative remarks)
59. Number of S's remarks falling in Category D. (261)
60. Index of malintegration: D/A/D computed for each subject. (See 261.72)
61. B/C
62.  $A+D / B+C$
63. Rank in group of subject, based on D / A+D. (261.72)
64. Rank in group of subject, based on B/C. (261.73)
65. Rank in group of subject, based on  $A+D / B+C$ . (261.74)
66. Leadership Ia. Rank in group on basis of total number of tabs received in 15 situations. (252)
81. Friendship selection (Session III). Number of votes of preference as a friend received from peers in group. (111)
82. Friendship selection (Session II) Number of votes of preference as a friend received from peers in group. (111)
83. Number of people the subject designated as leaders (Session III) (112)
84. Number of people the subject designated as friends. (Session III) (111)
85. Satisfaction with overall efficiency (Session I and II) (126)
86. Feeling of acceptance in verbal situations. (Session I, II, III) (119)
87. \_\_\_\_\_ action situations. (I, II, III) (119)
88. Unification of the group in verbal situations. (I, II, III) (125)
89. \_\_\_\_\_ action situations. (I, II, III) (125)
90. Felt freedom to participate. (Session I) (118)
91. \_\_\_\_\_ (Session II) (118)
92. \_\_\_\_\_ (Session III) (118)
93. Optimism for the group's future. (Session I, II, III) (122)
94. Satisfaction with group conformity. (Session II + III) (131)
95. Mean number of people the subject rejected. (Session I, II, III) (107)
96. Leadership VIII. Weighted retrospective sociometric report. Here first selection is weighted 4; second weighted 3 points; third, two points and fourth, fifth and sixth, 1 point each. (111)

97. Satisfaction with Leader II (Session III) (116)

98. Sum of variable 33 + 34 + 35 (Sociotetic rejection)

99. Weighted selection as friend (Session III) as for 81. Weighted selection: first selection is weighted 4; second weighted 3 points; third, two points and fourth, fifth and sixth, 1 point each. (111)

The categories, as indicated above, (Table 13) are based initially on our observation of groups in action and claim to be comprehensive at least for groups dealing with the varied situations with which we faced them here. They cover both the giving and the receiving ends of an interaction process, and both individual-individual and individual-group relations. Interpretations is kept at the lowest level possible compatible with meaningful categories. This principle is well observed in such categories as "encourages", "asks information" "neglects others", but the senior author allowed himself to be persuaded by his research associates, and by Bales' later categories, to include "Relaxes Tension", "Shows Egoism" despite their conflict with the principle. (Incidentally our labels were modified, later in re-labelling later to permit easy recognition of parallel categories with Bales' and this sometimes increased the role given to interpretations). Additional possible breakdowns could be made in terms of our breakdown of synergy e.g. into intrinsic, effective ergic, and other categories; but at this stage it seems wiser to retain categories based directly on empiricism.

Although the observers found that they could handle these categories with tolerable confidence we nevertheless found that some observers used all categories with greater frequency than others. It was as if they had a lower threshold of reaction or, a greater vigilance of observation. Finally, therefore, we decided to divide the scores in the separate categories made by each observer by a constant divisor representing his total vigilance. The scores for individuals are the compounded scores of observers when these corrections have been made.

We now set out to correlate each of the personality factor measurements, for the 400 non-student subjects tested in the second year of the project, with each of the modes of group behavior as well as with certain sociometric and leadership criteria as with results as set out in Table 14.

Table 14

Correlations of Individual Behavior with Personality Factors

16 P.F. SCORES

| Individual<br>Variable<br>Number | A   | B  | C   | E  | F   | G   | H   | I   | L   | M   | N  | O   | Q <sub>1</sub> | Q <sub>2</sub> | Q <sub>3</sub> | Q <sub>4</sub> |
|----------------------------------|-----|----|-----|----|-----|-----|-----|-----|-----|-----|----|-----|----------------|----------------|----------------|----------------|
| 17                               | -10 | 03 | -11 | 07 | -03 | 07  | -12 | 04  | 19  | -07 | 00 | 10  | -04            | -04            | 10             | 04             |
| 20                               | 17  | 09 | 04  | 17 | 29  | 05  | 27  | -02 | -12 | -10 | 15 | -12 | 05             | -12            | 04             | -03            |
| 23                               | 09  | 10 | 05  | 07 | 19  | 01  | 25  | 00  | -10 | 07  | 11 | -05 | 11             | -08            | -05            | -05            |
| 24                               | 08  | 04 | 09  | 08 | 26  | -04 | 27  | -04 | -08 | -01 | 10 | -16 | 02             | -06            | 04             | -10            |
| 25                               | 10  | 12 | -02 | 18 | 18  | 03  | 30  | -05 | -06 | -03 | 11 | -16 | 01             | 04             | 06             | -04            |
| 26                               | 08  | 03 | 05  | 11 | 29  | -04 | 27  | -05 | -06 | -06 | 22 | -18 | 11             | -11            | 12             | -09            |

Individual  
Variable  
No.

|    | A   | B   | C   | E   | F   | G   | H   | I   | L   | M   | N   | O   | Q1  | Q2  | Q3  | Q4  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 27 | 04  | 07  | 08  | 13  | 04  | 02  | 11  | -04 | -07 | -06 | -08 | -10 | -05 | -04 | 17  | -08 |
| 30 | 06  | 12  | -10 | 00  | 16  | 08  | 14  | -15 | 00  | -07 | 04  | -22 | -04 | -15 | 15  | -28 |
| 31 | -03 | 09  | -18 | 10  | 17  | 01  | 16  | -13 | 00  | 07  | 02  | -10 | 03  | 05  | 03  | -05 |
| 32 | 17  | 00  | -07 | 03  | -04 | 05  | -01 | -05 | 00  | -02 | 08  | 00  | 03  | 05  | -09 | 00  |
| 33 | 00  | 07  | -03 | -07 | -03 | 02  | 02  | 07  | 07  | 12  | 02  | 08  | 15  | 13  | -13 | 08  |
| 34 | 08  | -05 | -16 | -06 | -09 | 02  | -05 | 20  | 05  | 06  | 02  | 07  | -06 | 05  | -19 | 05  |
| 35 | -06 | -20 | 08  | -16 | 06  | -04 | 02  | -01 | 08  | -17 | -06 | 05  | -08 | -25 | 00  | 00  |
| 36 | 03  | 10  | -03 | 11  | 24  | 13  | 20  | 03  | 07  | 00  | -02 | -15 | 00  | 05  | 05  | -05 |
| 37 | -19 | -25 | -15 | -07 | -21 | 00  | 29  | 01  | 08  | -02 | -07 | 20  | -01 | -06 | -17 | 07  |
| 38 | 00  | 20  | 04  | 16  | 25  | 04  | 20  | -08 | 08  | 05  | 11  | -10 | 17  | 00  | 00  | -04 |
| 39 | -10 | 00  | 01  | -10 | 16  | -08 | -04 | 04  | 05  | 02  | 06  | 05  | -03 | -05 | 01  | -01 |
| 40 | 16  | -16 | -06 | -08 | -20 | 00  | -20 | 11  | 13  | 11  | -20 | 16  | 09  | 19  | -30 | 14  |
| 42 | 07  | -15 | -19 | 07  | -10 | -09 | -07 | 22  | 02  | 06  | -17 | 11  | -01 | 07  | -08 | 11  |
| 43 | 09  | 15  | 07  | 10  | 10  | 05  | 20  | 06  | -04 | 00  | 14  | -15 | 07  | -05 | -02 | -08 |
| 44 | 19  | 07  | 00  | 07  | 18  | 06  | 06  | 15  | 05  | 18  | -04 | 02  | 03  | -01 | -05 | 05  |
| 45 | 11  | 11  | 22  | 07  | 18  | -08 | 23  | -02 | -16 | 03  | 04  | -13 | 01  | -03 | 01  | -03 |
| 46 | 14  | 18  | 07  | 13  | 16  | -04 | 27  | 09  | -08 | 09  | -03 | -10 | -03 | -14 | 02  | 04  |
| 47 | -09 | -01 | -07 | -19 | 07  | 01  | 10  | 12  | -15 | 00  | -01 | 00  | 04  | -03 | 02  | -03 |
| 48 | -05 | -05 | -11 | 05  | 02  | 02  | 03  | 01  | -08 | -04 | -04 | 07  | 08  | 10  | -01 | -04 |
| 49 | -06 | -04 | 07  | -03 | -09 | 00  | 04  | 00  | -09 | -09 | -10 | 05  | -14 | 10  | -04 | 00  |
| 50 | -09 | 05  | 00  | 04  | -12 | 28  | 03  | 17  | 00  | -10 | 07  | 03  | -05 | 07  | 31  | 03  |
| 51 | 16  | 23  | 04  | 04  | 07  | 09  | 12  | 14  | -03 | 04  | 13  | -10 | 00  | -06 | 19  | 03  |
| 52 | 28  | 14  | 12  | 15  | 34  | -07 | 09  | 05  | 18  | 25  | 00  | 09  | 19  | 11  | -10 | 15  |
| 53 | 29  | 30  | 09  | 22  | 10  | 05  | 28  | 10  | 00  | 00  | 19  | -10 | 05  | 00  | 27  | 03  |
| 54 | -10 | 01  | 08  | 10  | -04 | 26  | 06  | 10  | 00  | -15 | 12  | 10  | -05 | 00  | 19  | 04  |
| 55 | -09 | 03  | 00  | 10  | 10  | 18  | 00  | 17  | 08  | -26 | 00  | 10  | -07 | 10  | 22  | 10  |

Individual  
Variable  
Number

|    | A   | B   | C   | E   | F   | G   | H   | I   | L   | M   | N   | O   | Q1  | Q2  | Q3  | Q4  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 56 | 16  | 05  | 08  | 16  | 03  | 12  | 12  | 10  | -07 | -03 | 07  | -03 | 08  | 07  | 17  | 09  |
| 57 | 10  | 17  | 00  | 22  | 04  | 25  | 12  | 04  | 00  | 04  | 19  | -04 | 20  | 08  | 21  | 10  |
| 58 | 10  | 41  | 08  | 35  | 22  | 07  | 19  | -04 | 06  | -06 | 12  | -10 | 31  | 04  | 14  | -04 |
| 59 | 17  | 20  | 08  | 16  | -03 | 12  | 19  | 22  | -07 | 04  | 13  | -10 | 18  | 00  | 15  | 09  |
| 60 | 17  | 23  | 08  | 29  | 10  | 07  | 25  | 04  | 00  | 03  | 20  | -10 | 19  | 12  | 15  | 04  |
| 61 | 04  | 10  | 08  | -03 | -04 | -13 | 01  | 10  | 07  | 07  | 01  | 09  | -14 | 16  | -04 | -04 |
| 62 | 28  | 33  | 13  | 23  | 04  | 13  | 25  | 04  | -07 | -03 | 26  | -23 | 16  | 07  | 28  | -03 |
| 63 | -05 | -09 | 08  | 04  | 16  | 07  | 00  | -03 | 06  | 16  | 07  | 15  | -05 | 07  | 09  | 15  |
| 64 | 10  | 10  | 07  | 20  | 10  | 10  | 16  | 04  | 00  | -03 | 12  | -03 | 13  | 00  | 07  | 03  |
| 66 | 23  | 02  | 07  | 08  | 22  | -13 | 10  | 16  | -07 | 20  | 00  | 03  | 01  | 04  | -03 | 03  |
| 81 | 11  | 17  | 00  | 14  | 19  | -09 | 28  | -08 | 01  | -06 | 11  | -13 | 09  | -19 | 05  | 01  |
| 82 | 16  | 10  | 12  | 09  | 27  | 00  | 34  | -06 | -20 | -06 | 09  | -17 | 08  | -10 | 09  | -09 |
| 83 | 04  | 10  | 09  | 10  | -19 | -02 | 10  | -04 | -15 | -09 | 14  | -14 | 07  | -04 | 04  | -21 |
| 84 | 03  | 11  | 08  | 03  | -19 | -07 | 09  | 07  | -10 | 03  | 03  | -16 | 09  | 09  | -07 | -09 |
| 85 | -07 | -03 | 00  | -13 | 22  | 00  | 04  | 13  | -03 | -09 | -13 | -13 | 04  | -17 | -10 | -03 |
| 86 | 00  | 13  | 07  | 13  | 09  | 07  | 34  | -07 | -10 | -16 | 00  | -19 | 15  | -16 | 10  | -10 |
| 87 | 07  | 16  | 07  | 15  | 00  | 07  | 34  | -12 | -17 | -22 | 10  | -22 | 15  | -03 | 03  | -16 |
| 88 | -06 | -03 | 07  | -12 | -10 | 06  | 10  | -12 | -16 | -16 | -19 | -13 | -03 | -22 | 15  | -16 |
| 89 | -13 | 03  | 00  | -12 | -03 | 07  | 03  | -12 | -10 | -16 | -13 | -13 | -10 | -28 | 03  | -22 |
| 90 | -13 | -13 | -05 | -22 | -25 | -06 | -34 | 00  | 03  | 03  | -12 | 16  | -16 | -03 | -10 | 10  |
| 91 | -20 | -20 | -20 | -10 | -03 | -20 | -40 | 12  | 03  | -03 | -03 | 28  | -03 | 10  | -16 | 15  |
| 92 | -13 | -33 | -20 | -13 | -05 | -25 | -40 | -25 | -03 | 07  | -10 | 18  | -03 | 15  | -10 | 15  |
| 93 | 00  | -13 | -06 | -03 | 07  | -07 | 05  | -03 | -05 | 05  | -10 | 00  | 04  | -25 | 00  | -04 |
| 94 | -05 | 26  | 21  | 10  | -05 | -02 | 26  | -24 | -23 | -28 | 10  | -26 | 00  | -18 | 19  | -34 |
| 95 | 12  | 00  | -16 | 04  | 08  | -04 | -03 | 04  | 10  | 04  | -03 | 11  | 07  | 12  | -07 | 15  |

At first glance one might have the impression that these correlations are a distribution of chance values about zero. Certainly no  $r$  is of outstanding magnitude. A consideration of attenuating influences which might have operated discloses nothing disabling.

For, in the first place, the reliabilities of the personality factors are adequate and on the average, as Table 8 indicates, the interaction counts are also adequate. However, the latter reliabilities over-estimate what is likely to be found for individual entries on individual categories. In many categories the number of entries usually occurring becomes very small--two or three on an average--and our measure of how frequently the individual say "states his wishes" or "rejects the group" has little generalizability to how much he would do this in group situations in general.

A possible source of unreliability in these same measures is the fact that different observers used both "individual" and "all" categories with different total frequencies. An analysis of variance test was made to see if a substantial part of the inter-individual variance might be inter-group variance, in which case a large role might be given to inter-observer difference, but nothing significant was found. Against the existence of any appreciable attenuation from this source must also be considered our deliberate restriction of the analysis to a population uniformly observed and recorded by only three observers (our best) and the fact that certain important categories had their frequencies divided by the total frequency with which the observer checked all categories, before the correlation was made.

With the size of the group we used--337 cases--many more of the above  $r$ 's would have been significant had we been in a position to use other than tetrachoric coefficients. By the formula for tetrachoric sigma the lowest  $r$  on this population to be significant at the 5% level is .16, and the lowest at the 1% level is .22. This yields, on 912 correlations, a chance expectancy of apparent significance of 46 and 9  $r$ 's respectively, whereas in fact we have 191 and 78  $r$ 's at these levels. Thus the lowness or moderateness of the correlations is nothing to do with insignificance but simply indicates that the personality of the individual is only one of several sources of variations responsible for group interactive behavior. Within the range in which personality may operate, however, the connections are highly significant.

Table 15

INDIVIDUAL BEHAVIOR IN GROUP SIGNIFICANTLY  
ASSOCIATED WITH PERSONALITY FACTORS

FACTOR A. Friendly Cyclothymia vs. Taciturn Schizothymia

| Variable        |        |  |
|-----------------|--------|--|
| $r$             | Number | 1% level   |
| .29             | 53     | Number of social-emotional positive remarks            |
| .28             | 52     | (High) percentage of social-emotional positive remarks |
| .28             | 62     | Ratio of social-emotional to task oriented remarks     |
| .23             | 66     | Rank in group on number of times leadership shown      |
| <u>5% level</u> |        |  |
| -.20            | 91     | Did feel free to participate (Session II)              |
| .19             | 44     | Rated as a significant number                          |
| .19             | 37     | Not frequently scored as ineffective speaker           |

|     |    |  |
|-----|----|--|
| .17 | 59 | Number of remarks in social-emotional negative category    |
| .17 | 60 | Index of malintegration                                    |
| .17 | 20 | Many sociometric votes as leader in construction situation |
| .17 | 32 | Sociotelic Selection. Many votes at end of session III     |
| .16 | 40 | Many votes as a hinderance                                 |
| .16 | 51 | Rank in group on basis of number of remarks made           |
| .16 | 56 | High percentage of remarks on task-oriented questions      |
| .16 | 82 | Receives many selections as a friend (Session II)          |

#### FACTOR B. General Intelligence

##### 1% level

|      |    |  |
|------|----|--|
| .41  | 58 | High percentage of remarks in social-emotional negative category |
| .33  | 62 | High ratio of social-emotional to task-oriented remarks          |
| -.33 | 92 | Did feel free to participate in session III                      |
| .30  | 53 | High number of social-emotional positive remarks                 |
| .26  | 94 | Is satisfied with conformity of group                            |
| -.25 | 37 | Not rated an ineffective speaker                                 |
| .23  | 51 | Rank in group on basis number of remarks made                    |
| .23  | 60 | Index of malintegration  |

See Table 13

##### 5% level

|      |    |  |
|------|----|--|
| -.20 | 35 | Receives few sociotelic rejections in session III  |
| .20  | 38 | Receives many votes as a significant contributor   |
| .20  | 59 | Number of social-emotional negative remarks (high) |
| -.20 | 91 | Does not feel free to participate, session II      |
| .18  | 46 | High psychetelic selection, session III            |
| .17  | 57 | Many task-oriented questions                       |
| .17  | 81 | Receives many selections as friend                 |
| .16  | 40 | Receives few votes as a hinderer                   |
| .16  | 87 | Feels accepted by peers in action situations       |

#### FACTOR C. Emotional Maturity

##### 1% level

|     |    |                                  |
|-----|----|----------------------------------|
| .22 | 45 | Psychetelic selection, session I |
|-----|----|----------------------------------|

##### 5% level

|      |    |  |
|------|----|--|
| .21  | 94 | Is satisfied with group conformity         |
| -.20 | 91 | Does feel free to participate, session II  |
| -.20 | 92 | Does feel free to participate, session III |
| -.19 | 42 | Receives few votes as negative effector    |
| -.18 | 31 | Sociotelic selection, session II           |
| -.16 | 34 | Sociotelic rejection, session II           |
| -.16 | 95 | Rejects few peers                          |

#### FACTOR E. Dominance

##### 1% level

|     |    |   |
|-----|----|---|
| .35 | 58 | Percentage of social-emotional negative remarks |
| .29 | 60 | Index of malintegration                         |

|      |   |    |   |    |
|------|---|----|---|----|
| .23  | 1 | 62 | Ratio of social-emotional to task-oriented remarks          |    |
| .22  |   | 53 | Number of remarks falling in social-emotional positive area | 85 |
| .22  |   | 57 | Number of remarks falling in task problem-raising area      |    |
| -.22 |   | 90 | Does feel free to participate (Session I)                   |    |

5% level

|      |  |    |  |  |
|------|--|----|--|--|
| .20  |  | 64 | Rank in group: ratio of task-oriented answers to questions         |  |
| -.19 |  | 47 | Report dissatisfaction with leader in action situations, session I |  |
| .18  |  | 25 | Sociotelic selection, verbal situations, session I                 |  |
| .17  |  | 20 | Receive many votes as leader in construction situation             |  |
| -.16 |  | 35 | Sociotelic rejection, session III                                  |  |
| .16  |  | 38 | Many votes as significant contributor                              |  |
| .16  |  | 56 | High percentage of remarks are task-oriented questions             |  |
| .16  |  | 59 | Many social-emotional negative remarks                             |  |

FACTOR F. Surgency

1% level

|      |        |    |  |  |
|------|--------|----|--|--|
| .34  |        | 52 | Percentage of remarks falling in social-emotional positive category    |  |
| .29  |        | 20 | Many sociometric votes as showing leadership in construction situation |  |
| .29  |        | 26 | Sociotelic selection in action situations, session III                 |  |
| .27  |        | 82 | Receives many votes of acceptance as a friend, session II              |  |
| .26  |        | 24 | Sociotelic selection in action situations, session I                   |  |
| .25  |        | 38 | Many votes as a significant contributor                                |  |
| -.25 | (1190) |    | Does feel free to participate in Session I                             |  |
| .24  |        | 36 | Rated on effective speaker   |  |
| .22  |        | 58 | High percentage of remarks in social-emotional negative category       |  |
| .22  |        | 66 | Rank in group as on number of times leadership shown                   |  |
| .22  |        | 85 | Satisfied with overall efficiency of group                             |  |

5% level

|      |  |    |  |  |
|------|--|----|--|--|
| -.21 |  | 37 | Not rated an ineffective speaker                           |  |
| -.20 |  | 40 | Few votes as an hinderer                                   |  |
| .19  |  | 23 | Many sociometric votes as a leader (all sessions)          |  |
| .19  |  | 81 | Many selections as a friend                                |  |
| -.19 |  | 83 | Designates few peers as having been leaders                |  |
| -.19 |  | 84 | Designates few peers as having been acceptable as friends  |  |
| .18  |  | 25 | Sociotelic selection, verbal situations, session I         |  |
| .18  |  | 44 | Many peers rate as a significant contributor               |  |
| .18  |  | 45 | Psychotelic selection, session I                           |  |
| .17  |  | 31 | Sociotelic selection, session II                           |  |
| .16  |  | 30 | Sociotelic selection, session I                            |  |
| .16  |  | 39 | Makes a significant contribution in target throw situation |  |
| .16  |  | 46 | Psychotelic selection, session III                         |  |
| .16  |  | 63 | Rank in group: Index of malintegration                     |  |



# FACTOR G. Positive Character Integration

## 1% level

|      |    |  |
|------|----|--|
| .28  | 50 | High percentage of total participation     |
| .26  | 54 | High percentage of task-oriented answers   |
| .25  | 57 | Many task oriented questions               |
| -.25 | 92 | Does feel free to participate, session III |

## 5% level

|     |    |  |
|-----|----|--|
| .20 | 91 | Does feel free to participate, session II                  |
| .18 | 55 | Many remarks falling in task solution proposing categories |

# FACTOR H. Adventurous Cyclothymia vs. Self-Conscious, Withdrawn Schizothymia

## 1% level

|      |    |  |
|------|----|--|
| -.40 | 91 | Does feel free to participate (Session II)                   |
| -.40 | 92 | Does feel free to participate (Session III)                  |
| .34  | 82 | Receives many votes of acceptance as a friend                |
| .34  | 86 | Feels accepted in verbal situations                          |
| .34  | 87 | Feels accepted in action situations                          |
| -.34 | 90 | Feels free to participate (Session I)                        |
| .30  | 25 | Sociotelic selection, verbal situations (Session I)          |
| .29  | 37 | Receives many votes as an ineffective speaker                |
| .28  | 53 | Many social-emotional positive remarks                       |
| .28  | 81 | Receives many votes as acceptable as friend (Session III)    |
| .27  | 20 | Many votes as leader in construction situation               |
| .27  | 24 | Sociotelic selection action situations, Session I            |
| .27  | 26 | Sociotelic selection action situations, Session III          |
| .27  | 46 | Psychetelic selection, Session III                           |
| .26  | 94 | Are satisfied with group conformity                          |
| .25  | 23 | Receive many sociometric votes as leaders (three sessions)   |
| .25  | 60 | Index of malintegration                                      |
| .25  | 62 | High ratio social-emotional to task oriented verbal behavior |
| .23  | 45 | Psychetelic selection, Session I                             |

## 5% level

|      |    |  |
|------|----|--|
| .20  | 36 | Many votes as an effective speaker                                 |
| .20  | 38 | Many votes as a significant contributor                            |
| -.20 | 40 | Few votes as a significant hinderer                                |
| .20  | 43 | Many votes as a negative effector in action situations             |
| .19  | 58 | High percentage of social-emotional negative remarks               |
| .19  | 59 | Large number of social-emotional negative remarks                  |
| .16  | 31 | Sociotelic selection. Session II                                   |
| .16  | 64 | Rank in group on basis of ratio task oriented answers to questions |

# FACTOR I. Emotionally Sensitive vs Practical, Hard-Headed

## 1% level

|      |    |  |
|------|----|--|
| -.25 | 92 | Do feel free to participate, session III                 |
| -.24 | 94 | Are not satisfied with group rule conformity             |
| .22  | 42 | Receive many votes as slowing group in verbal situations |
| .22  | 59 | Many social-emotional negative remarks                   |

5% level

|     |    |   |
|-----|----|---|
| .20 | 34 | Sociotelic rejection, Session II                      |
| .17 | 55 | Many remarks propose solution or procedure            |
| .16 | 66 | Rank in group on number of leadership instances noted |

FACTOR L. Paranoid Suspiciousness

1% level

|      |    |  |
|------|----|--|
| -.23 | 94 | Not satisfied with group conformity with rules |
|------|----|--|

5% level

|      |    |  |
|------|----|--|
| -.20 | 82 | Receive few selections as a friend                       |
| .19  | 17 | Frequently noted to show leadership                      |
| .18  | 52 | High percentage of remarks are social-emotional positive |
| -.17 | 87 | Do not feel accepted in action situations                |
| -.16 | 88 | Rate group unification as low in verbal situations       |

FACTOR M. Bohemian Aggressiveness vs. Practical Concernedness

1% level

|      |    |   |
|------|----|---|
| -.28 | 94 | Not satisfied with group conformity to rules        |
| .25  | 52 | High percentage of remarks in social-emotional area |
| -.22 | 87 | Do not feel accepted in action situations           |

5% level

|      |    |  |
|------|----|--|
| .20  | 66 | Rank in group on basis of number of times leadership noted |
| .18  | 44 | Rated high as a significant member of the group            |
| -.17 | 35 | Sociotelic rejection, Session III                          |
| .16  | 63 | Rank in group on index of malintegration                   |
| -.16 | 88 | Rate unification of group as low in verbal situations      |
| -.16 | 89 | Rate unification of group as low in action situations      |

FACTOR N. Polished Fastidiousness vs Rough Simplicity

1% level

|      |    |  |
|------|----|--|
| .26  | 62 | High ratio emotional to task oriented remarks        |
| -.22 | 26 | Sociotelic selection, action situations, session III |

5% level

|      |    |   |
|------|----|---|
| -.20 | 40 | Receive few votes as hinderers                  |
| .20  | 60 | High index of malintegration                    |
| .19  | 53 | Many social-emotional positive remarks          |
| .19  | 57 | Many task-oriented questions                    |
| -.19 | 88 | Rate group unification low in verbal situations |
| -.17 | 42 | Few selections as having slowed group progress  |

FACTOR O. Worrying Suspicious Anxiety vs. Calm Trustfulness

1% level

|      |    |   |
|------|----|---|
| .28  | 91 | Do not feel free to participate (Session II)        |
| -.26 | 94 | Are not satisfied with group conformity to rules    |
| -.23 | 62 | Low ratio emotional to task oriented verbal remarks |
| -.22 | 30 | Sociotelic selection, Session I                     |
| -.22 | 87 | Do not feel accepted in action situations           |

5% level

|      |    |   |
|------|----|---|
| .20  | 37 | Are rated as ineffective speakers                   |
| -.19 | 86 | Do not feel accepted in verbal situations           |
| -.18 | 26 | Sociotelic Selection action situations, Session III |
| .18  | 92 | Do not feel free to participate, Session III        |
| -.17 | 62 | Receive few votes as a friend, Session II           |
| -.16 | 24 | Sociotelic selection, action situations, Session I  |
| -.16 | 25 | Sociotelic selection, verbal situations, Session I  |
| .16  | 40 | Receive many votes as hinderers of group            |
| -.16 | 84 | Select few peers as friends, Session III            |
| .16  | 90 | Do not feel free to participate, Session I          |

FACTOR Q<sub>1</sub>. Radicalism vs Conservatism

1% level

|     |    |  |
|-----|----|--|
| .31 | 58 | High percentage of subjects remarks fall in social-emotional negative category |
|-----|----|--|

5% level

|      |    |  |
|------|----|--|
| .20  | 57 | High number of task oriented questions                               |
| .19  | 52 | High percentage of remarks in social-emotional positive category     |
| .19  | 60 | High index of malintegration   |
| .18  | 59 | High number of remarks in social-emotional negative category         |
| .17  | 38 | Receives many votes as a 'significant contributor' to the group task |
| .16  | 62 | High ratio of social-emotional to task oriented verbal contributions |
| -.16 | 90 | Do feel free to participate, session I                               |

FACTOR Q<sub>2</sub>. Independent Self-Sufficiency vs. Lack of Resolution

1% level

|      |    |  |
|------|----|--|
| -.28 | 89 | Rates unification of group low in action situations          |
| -.25 | 35 | Receives few rejections in session III (Sociotelic criteria) |
| -.25 | 93 | Is not optimistic for group's future                         |
| -.22 | 88 | Rates unification low in verbal situations                   |

5% level

|      |    |   |
|------|----|---|
| .19  | 40 | Receives many votes as a hinderer   |
| -.18 | 94 | Is not satisfied with group conformity to rules                           |
| -.17 | 85 | Is not satisfied with overall efficiency of group                         |
| .16  | 61 | High ratio of proposed task oriented solutions to task-oriented questions |
| -.16 | 86 | Does not feel accepted in verbal situations                               |

### FACTOR Q<sub>3</sub>. Deliberate Will Control vs. Lack of Independence

#### 1% level

|      |    |  |
|------|----|--|
| .31  | 50 | Makes high percentage of all remarks made in group (Jury Judgment Situation) |
| -.30 | 40 | Receives <u>few</u> votes as a hinderer                                      |
| .28  | 62 | High ratio emotional to task oriented verbal behavior                        |
| .27  | 53 | High number of remarks in social-emotional positive area                     |
| .22  | 55 | High number of remarks in solution proposing area                            |

#### 5% level

|      |    |   |
|------|----|---|
| .21  | 57 | High number of remarks in solution requesting area          |
| -.19 | 34 | Receives few rejections at end of session II                |
| .19  | 51 | Rank in group on basis of number of contributions           |
| .19  | 54 | High percentage of remarks in solution proposing area       |
| .19  | 94 | Is satisfied with group's conformity to rules               |
| .17  | 27 | Sociotelic selection, verbal situations, session III        |
| -.17 | 37 | Receives few ratings as an ineffective speaker              |
| .17  | 56 | High percentage of remarks fall in solution requesting area |
| -.16 | 91 | Does feel free to participate (Session II)                  |

### FACTOR Q<sub>4</sub>. Nervous Tension

#### 1% level

|      |    |   |
|------|----|---|
| -.34 | 94 | Is not satisfied with way group conforms to the rules     |
| -.28 | 30 | Receives <u>few</u> votes. Sociotelic criteria, Session I |
| -.22 | 89 | Rates group unification low in action situations          |

#### 5% level

|      |    |  |
|------|----|--|
| -.21 | 83 | Indicates there are few people who showed leadership |
| -.16 | 87 | Does not feel accepted in action situations          |
| -.16 | 88 | Rates group unification low in verbal situations     |

It will be seen that quite a large number of significant r's exist and that they are consistent in psychological meaning with what is known about the personality factors. Thus the cyclothyme makes more socio-emotional (chatty, personal) than task-oriented remarks and makes more of the former of a positive nature. The intelligent makes more negative remarks (critical) but also more remarks of all kinds. The emotionally mature is more frequently chosen by others as a friend (see initial finding of this kind in paper by Cattell "Friends and Enemies" etc. 1934, (1b)). The dominant has a higher index of malintegration and the submissive less frequently reports that he feels free to participate. Surgency has a particularly large number of relations significant at the 1% level. The surgent person receives many votes of acceptance as a friend, as an effective speaker and as a significant contributor. The high G person is especially task-oriented, as one would expect, and so on.

No attempt will be made in the space of this report at "clinical" type psychological explanation, but it is easy to see that this data permits us to understand, and amplify the details of, those relations between personality and group performance demonstrated in the previous chapters.

The special study by Stice on attitudes asked the very important question as to what governs changes of attitude of individuals under group pressure. Apart from some investigation by Asch and by Goldberg, from a different viewpoint but ultimately with congruent findings, no study of attitude change influences seems to have been made in experimental groups. The primary questions to ask are (1) What are the natures and distributions of attitude changes? (2) Are the attitude changes significantly related to personality characteristics of the members? (3) Are they related to the nature of the attitudes? (4) Are they related to the nature of group syntality, including the leadership?

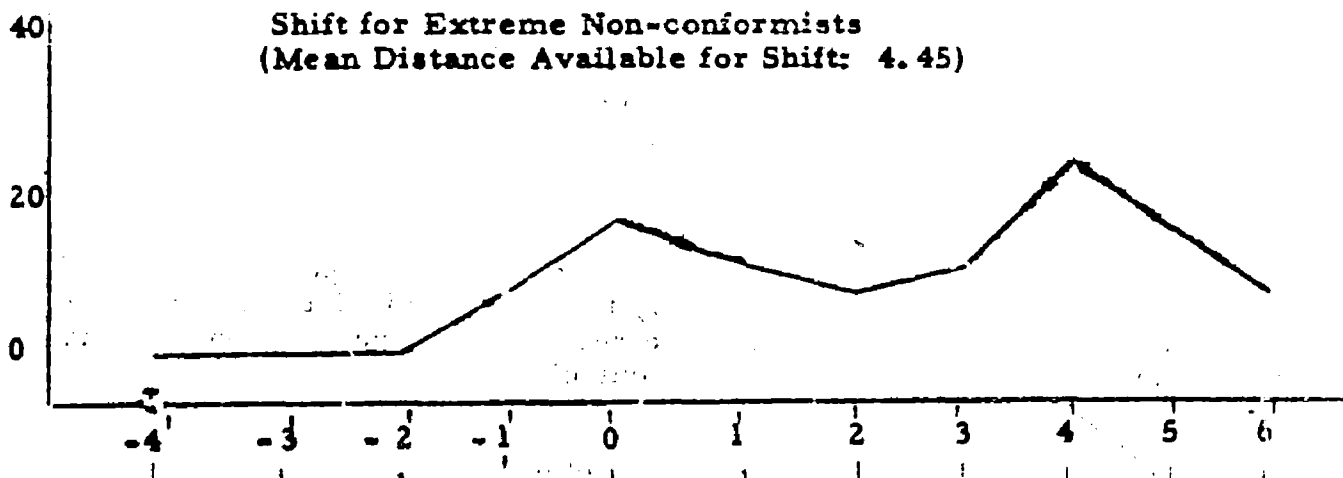
The basic design of the group experiment was such that in a number of situations the influence of the group on the non-group-oriented behavior of the individual member could readily be studied. This was done for the attitude and the interest situations by getting private expressions of opinion (or preferences, in the case of the interest situation) upon the same materials used to get a group decision. This was done both before a group meeting and following a group decision. Changes in responses were then studied in relation to the group decision that had intervened. These changes after being related to the group decisions were related to individual personality and group syntality characteristics.

In response to the first of the above questions the data from this study indicated that there are two kinds of individual responses to participation in the group decision when measured as in the attitude situation. When the individual's expressed opinion was modified at all, it tended to be brought, within the limits of measurement which could be used, into complete agreement with the group position. If this was not done, then the most common response was to maintain the originally expressed opinion, unmodified by the group decision. That is to say, the distribution of shifts between pre-group to post-group discussion was bimodal, with modes at "no shift" indicating maintenance of the pre-discussion opinion and at the point corresponding to the distance between the pre-discussion opinion and the group decision apparently indicating an experienced acceptance of the group decision. Two of these distributions are shown in Table 16.

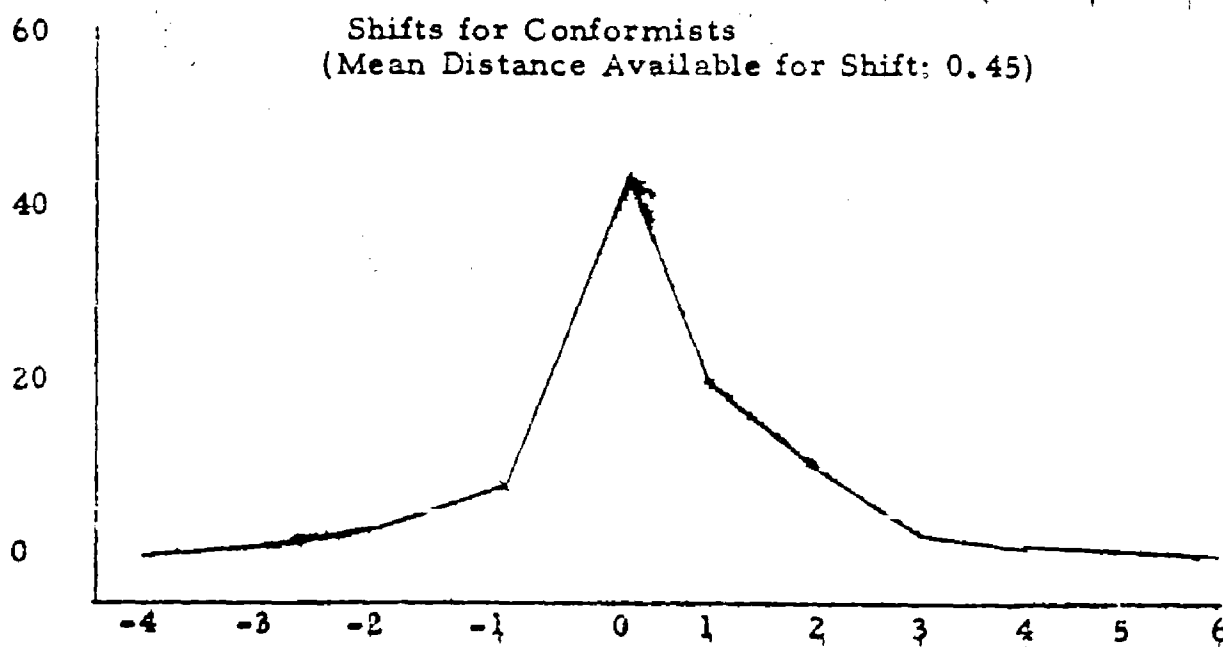
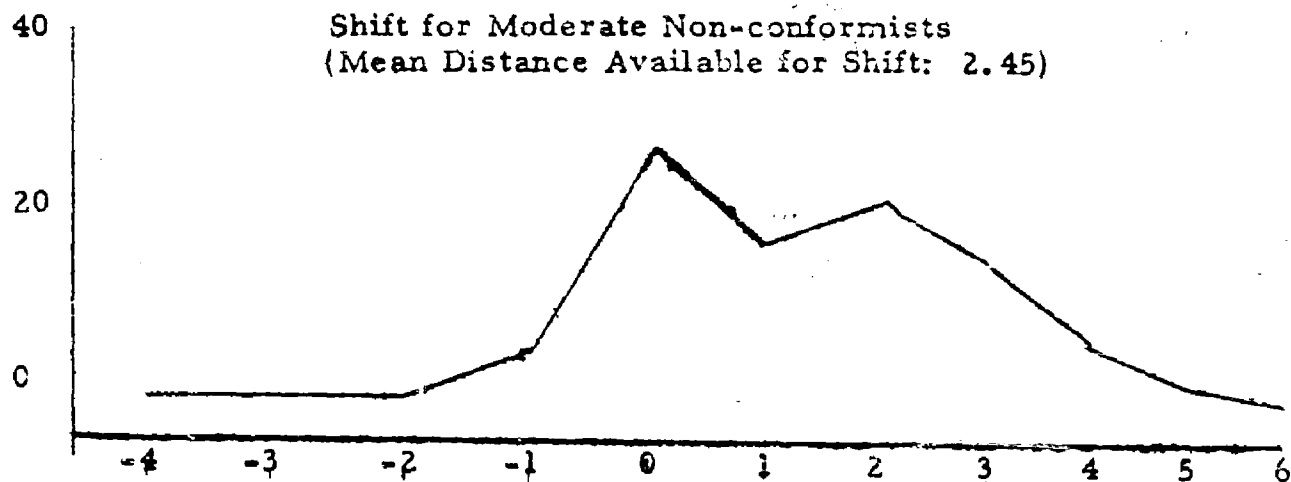
Table 16.

THE DISTRIBUTION OF CHANGES BETWEEN PRE- AND POST-GROUP DISCUSSION FOR MEMBERS ATTITUDE EXPRESSIONS.

Percent  
of  
cases



Percent  
of  
cases



Before we can investigate the relation of attitude shift to personality it is necessary to show at least that "shift behavior" is characteristic of the person. Actually, the attitude shift behavior was found to be completely unreliable when computed for individuals, thus apparently indicating that this kind of behavior is determined by something other than individual personality traits, and as might be expected from this, no correlations between shift behavior and the 16 PF scores were found.

The measure of influence which was used in the interest situation--where the individual was asked to divide 100 points in accordance with his relative preferences among the eleven alternatives presented for group discussion--was designated as "extent of interest", as opposed to "extent of agreement" used in the attitude situation. Using this measure individuals scoring high on personality trait E (dominance) and H (adventurous cyclothymia) and low on Q1 (radicalism) increased their indicated "interest" in their group's preferences more than did the average member of these groups.

In order to test the hypothesis that the role of these personality traits differed in groups with different syntality characteristics an analysis of variances between amount of increase in "extent of interest" and these three personality traits was done with the cases separated into five sets according to the factor scores of the experimental group on each of the 15 syntality factors (making a total of 5 x 15 analyses for each personality measurement).

These analyses were done for the personality traits, E, H and Q1 that had been found significant in the above sub-section. None of the resulting F-ratios proved to be significant and the hypothesis that the group's capacity to modify "extent of interest" was a function of some high order relationship between the individual personality and group syntality measures used in the present experiment was considered unverified.

The group characteristics in the first session which were found to be influential of individual voting behavior, syntality factors IV, IX, XII have been described in Chapter 4.

Obviously the present investigation has only the sensitivity of instrument considered necessary for an exploratory study. But at this initial sensitivity we can find no characteristics of the individual associated with magnitude of shift and only minor associations with the syntality of the group. The chief substantial association discoverable was a situational one--that the shift toward the group viewpoint, on the part of those who shifted at all, was proportional to the original distance from the group viewpoint, in the case of the "extent of interest" measurement, and, in the case of "extent of agreement", this more definitely resulted in complete agreement with the group's position.

## CHAPTER XII

### Summary and Contribution to Further Research Design

#### 1. The Research and its Main Findings

Summary of Research. Measures of 32 population (personality) dimensions, 45 group internal structure variables (sociometric, interactional and immediate observer assessment) and 34 group performance (syntality) variables were made on over 100 groups of 10 young men in each. The groups worked as teams for three sessions of three hours each, motivated by a (reasonably achievable) \$100 reward, and had a formal elected leader in the last two sessions.

The correlated variables (on 80 complete groups) were factor analysed (multiple analysis: simple structure) with the primary objective of (1) determining the most economical and meaningful dimensions by which the syntality and structural characteristics of small face-to-face groups can be measured. But secondary statistical breakdowns were made also to reveal (2) the degree of functional stability of group characteristics and behavior patterns (3) the personality characteristics of leaders and followers, (4) the group interactional (structural) behavior arising from various personality characteristics (5) the determinants of individual changes of attitudes and interests in relation to those of the group.

#### Summary of Findings

(1) The syntality (group performance) measures of neonate groups vary a good deal in reliability (stability and consistency coefficients) but run lower than for performances (traits) of individuals. The syntality panel characteristics also tend to be rather less stable than group structural characteristics, and, of course, than population characteristics. There are indications that they improve as the group gets older.

(2) Nevertheless, quite an adequate simple structure can be found for group dimensions, not different in order of goodness from that found with individuals. The reality and stability of these functional unities are witnessed also by the possibility of good matches of factors found in the three independent factorizations and rotations. This indicates, moreover, a persistence of structure through the first three sessions.

Fourteen to seventeen factors were found in each of the three sessions and thirteen of these factor patterns are stably recognizable in two or more sessions. Six are matchable through three sessions, four at a high level of confidence.

(3) The above thirteen stable dimensions of groups apparently have their origins in (a) the independence of individual personality factors, whereby groups with higher population means on these factors show characteristic resultant group behavior patterns (b) differences of variances (population scatter) on personality factors, producing "heterogeneity" effects with respect to single factors (c) powerful group "relational emergents" from certain combinations of personality factors in the group's population and (d) influences having nothing to do with population characteristics and their environmental repercussions, but arising from early history and circumstance, notably the "accident" of choice of a leader, strength of monetary motivation, state of fatigue or hunger, frequency of meetings etc.



(4) The present study is not simultaneously capable of giving exact information about the persistent syntality patterns and about syntality changes between sessions. But as to the second there are indications that the clarity and stability of the factor structures (hyperplanes and high loadings) increases from the first to the third session, --indicating more clearly developed syntality dimensions, --and that the population personality variables have relatively lower loadings in passing from first to third, indicating that structure, group experience and traditions are beginning to overshadow the pre-group personality factor (population) contribution to the characters of syntality.

(5) The personality factor profile of leaders differs significantly from followers. For all three methods of leader selection leaders are significantly (1% level) higher on H factor (Adventurous cyclothymia), O (-) factor (Freedom from anxiety), G factor (Integrated character) and Q3 factor (Deliberate will control), and less significantly, higher on B factor (Intelligence), C factor (Emotional maturity), E factor (Dominance), F factor (Surgency), I (-) factor (Hardness), M (-) factor (Practical concernedness), N factor (Polished fastidiousness), and Q4 (-) factor (Absence of nervous tension).

(6) The differences for elected leaders are slightly greater, all in all, than for those considered leaders by observers or those with many leader acts, but the only marked differences among leaders by these three criteria are (a) the elected leader is more definitely selected for high surgency (F factor) (b) the leader observed most to affect syntality is more selected for emotional stability (C factor) (c) the man with many leadership acts is relatively more selected for intelligence (B factor) and will control (Q3 factor).

(7) The tendency to practise particular interaction processes in group situations is related to personality characteristics of the individual members (as measured before they joined the group). There are many significant associations--eighty-six beyond the 1% level of chance--but few are nevertheless of a kind which account for more than a small part of the variance in the behavior concerned. (Much can therefore be ascribed to group atmospheres and "error".) The interactional and sociometric behavior is entirely consistent with what is known of the associated personality factors and adds to our understanding of their meaning. For example, the cyclothyme (A+) gives more socio-emotional than task-oriented remarks; the more emotionally mature (C+) is more frequently chosen as a friend; the more submissive (E-) feels less free to participate, the more surgent (F+) is more frequently rated an effective speaker and a significant contributor; while the person of higher integrated character (G+) makes more task-oriented contributions.

(8) Individual changes of attitude and interest toward those expressed by the group tend to be bi-modally distributed. Shifting or not shifting (and shifting a lot or shifting little,) show no demonstrable relation to the individual or his characteristics. They are slightly related to some syntality characteristics of the group but principally to the situation of the individual, the more deviantly situated tending to shift more toward the group.

## 2. Consequences for Applied Social Psychology.

Beyond the many consequences of the above findings for group dynamics theory are a number of conclusions that will be perceived to be of practical value by workers in special projects, and some which can be perceived by us here and now to be applicable generally in applied "group dynamics" and management. These latter are mainly:

(1) Knowledge which will enable small, face-to-face, neonate groups to be put together e.g. in naval, artillery, boat or aircraft crews, by personality selection in a way which will generate certain desired group characteristics.

(2) Validation of a sensitive personality test for selection of leaders, capable of giving predictions of individual degree of success by correlation with an empirical "successful leader" profile.

(3) A knowledge of the personality measures associated with certain group interactional behavior, including some that has definite "rejection" or "nuisance" value, and which could accordingly be reduced by selection.

(4) Practical measures of at least half-a-dozen important group dimensions, such as morale, synergy, democratic procedure, etc. which could be developed as standard Syntality Tests for use wherever comparisons of groups have to be made in routine situations, or in those numerous research studies which now lack evidence on the independence of the group characteristics with which they deal.

Let us consider these separately, elaborating only briefly and where it is necessary to supply the practising psychologist with missing links.

**SPECIFIC RECOMMENDATIONS:** (1): If the psychometrist building groups desires to increase only certain single dimensions the required personnel selection is indicated by the factors concerned, namely, high mean on B for raising group dimension 2, H for 3, A for 5, N for 6, F for 8a, Q4 for 9 and a reduction of variance (especially on N, M, L and I) for 7. But probably we can agree, even with present knowledge, that a good group is simultaneously high on several dimensions, notably on 2, immediate synergy, 5 Effective Role Interaction, 6 Sophisticated Democratic Determination, 7 (-) Freedom from Frustrations through Heterogeneity and 9(-) Strong Morale of Effort.

These five syntality factors combine to give good performances on such variables as high organization and orderliness, high performance on the dynamometer pull, accuracy on group judgment, general excellence on coordinated intellectual activities, rapidity in card sorting (accountancy-like tasks), construction and jury judgment, internal friendliness, tractability of individual attitudes, reduction of need for special leadership techniques, and resistance to panic (good performance in shock situation).

The required personnel selection recipe for a good group so defined i.e. for augmentations of group performances along the dimensions indicated above, calls for population selection principally on intelligence (B+), cyclothymia (A+), sophistication (N+), low variance on (N, M, L and I), low nervous tension (Q4-) and low general anxiety (O-). To a less definite extent selection is indicated also in favor of C+, E+, F+, H+, I-, L-, M- and Q3+.

(2) The profile of the accepted leader departs from that of the follower in a way which indicates that the best multiple regression equation for selecting (predicting) leaders should have beta weights of about 0.4 for the standard scores on factors F, G, H, O(-) and Q3, and about 0.2 for factors B, C, E, I(-), M(-), N and Q4(-). Until more precise correlations are worked out for specific groups and situations the equation could thus run

$$P_L \text{ (Performance leadership)} = .2B + .2C + .1E + .4F + .4G + .4H - .1I \\ - .2M + .1N - .4O + .4Q3 - .2Q4.$$

(3) If we assume that interactional behaviors characterized by high malintegrative index (ratio of socially negative to positive remarks), many ratings as an ineffective speaker, many ratings as a hinderer in group activities and a record of slowing the group activities plus a record of slowing the group in its verbal situations are bad, then the following should be selected out in forming a "good" group: E+ (Dominance), B- (Low intelligence), Q2 + (Independent self-sufficiency), and I+ (Sensitivity) respectively. Similarly, if we assume that making a high percentage of clarifying remarks, being dissatisfied with degree of group observation of rules, having a high total participation, showing leadership in construction activities and being a person to whom others are attracted, are good for group life then selection of population for Q3 + (Will control), L + ("Paranoid" tendency), G + (Character integration), F + (Surgency) and C + (Emotional Maturity) respectively, is desirable.

(4) Fractical test batteries are set out for the following nine more stable and important syntality dimensions,

- F1. High Synergy by Leadership (Morale IV)--vs--Disintegrative Low Morale IV.
- F2. High Immediate Synergy.
- F4. Plodding, Fortitudinous Morale (Morale III)
- F5. Intellectually Effective Role Interaction (Morale I)--vs--Low Morale I.
- F7. Frustration through Heterogeneity.
- F9. Garrulous Nervousness--vs--High Morale of Effort (V)
- F10. Low Reward Synergy--vs--High Morale VI
- F11. Rigid Deliberation.
- F12. Low Organization--vs--Sense of Purpose.

There are many situations in industry and the armed forces in which a diagnosis or prediction is required of the performance of a group in some important military or productive performance. Investigators of such problems have been apt in the past to try to get those predictions in terms of one or two limited tests of no known relationship to the general dimensions of groups. It would seem highly desirable to have a standard battery which can be applied to groups in many applied situations, so that regression equations can be worked out giving the best possible prediction of the group's performance in the required criterion, just as in primary personality measures for individuals.

Only by continued research with the same battery along these lines can sufficient meaning be given to the factors in terms of a variety of real-life criteria. For example, we have shown virtually what are five distinct morale factors<sup>1</sup> above, and it would be desirable to find what the importance of each of

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<sup>1</sup>To summarize our findings from the standpoint of Morale measurement we have in this, and in our former research, found six factors which lie in the area of resistance to group dissolution, the maintenance of effort, maintenance of standards etc. as previously roughly delimited by non-quantitative writings on morale. One of these, however, (Morale II), has not been found in our second study and is therefore put forward very tentatively, as a hypothesis needing confirmation. The six dimensions or sources of morale, (i.e. including one doubtful category) - may be briefly designated as follows:-

Morale I, or Intellectually Effective Role Interaction, a morale of intelligent mutual understanding in the group, with resultant effectiveness especially in intellectual tasks. (Factor 5 here)

- q Morale II, (Reported in (9)) Realism, Dependability Morale. Good morality in dealing with other groups, together with realism in interactions. (Not found here)
- Morale III, Plodding, Fortitudinous Morale. Good performance in shock and difficult situations, with little verbiage and a tendency to slow plodding planfulness. (Factor 4 here)
- Morale IV, High Synergy by Leadership. This is the most basic and important factor in Morale, arising from interest in the goals of the group and its leadership. (Factor 1 here)
- Morale V, Morale of High Effort. Freedom from nervousness (Q4) and from excessive verbality, with high performance of situations of shock, decision and effort. (Factor 9 here)
- Morale VI, High Reward Morale. Absence of indifference, non-participation, lack of unanimity, dissatisfaction with leader and low fortitude; through higher reward to group. (Factor 10 here)
- 

these is in a variety of military and other situations. Certainly the battery we have here can claim to be more comprehensive than any other as yet available and to have attempted deliberately to measure independent and major dimensions of groups of this kind. The argument needs perhaps to be repeated here, since it is very widely ignored, that all the dimensions of a group can in general contribute to any one performance and that attempts to predict group performance by taking only one or two into account - those which the experimenter has a hunch may be more important - is a very inadequate method of procedure. Therefore, although we cannot claim that these measures have as yet reached any high level of reliability and validity, it is probable that even for immediate practical purposes better prediction can be made from the combination of several such measurements of comparatively low reliability than from measuring with great reliability some one dimension.

A practical consideration in choosing tests is not only that they should be valid and reliable tests but also that they should be convenient to set up, and this consideration has caused us to reject one or two measuring devices which we would otherwise have included. Actually the choice of variables for the above group diagnosis battery is dictated by the usual standards of high loading on the factor concerned and low loading on other factors, though at this stage it would be inappropriate to attempt any "balancing" on other factors. (Though measures for the factor are kept as diverse as possible). In this situation also, where measurement of one group on many factors is likely to be ruled out by time considerations, it is desirable if possible to get two variables, where feasible, from one test situation. With the uncertainty about reliabilities in the early stage of group life one would wish to take a battery of six to eight tests per factor, but this must be ruled out, in favor of three or four, both through dearth of high loaded tests and probable dearth of group time in group work.

It is understood that the details of test administration and scoring in the following batteries are precisely as set out in the appendix on tests. It will be noticed that the aim is to measure the group by group performances, (including interactional sociometric, structural counts) and depending on observer ratings as little as possible. Population measures are completely eliminated, for although they frequently load factors more than do group performances they would require

individual testing and are not strictly group phenomena. However this exclusion of population measures from the original batteries has the advantage that the former can be brought as added evidence when the highest possible degree of validity of syntality factor measurement is required and when the population measures are in no sense to be involved in the outside criteria.

Battery for Factor 1. Synergy through Leadership (Synergy 2)

Sociometric count on group unity.  
" " " freedom to participate.  
Observer rating degree of interdependence.  
" " influence of the formal leader.

Battery for Factor 2. Immediate Synergy through Population (Synergy 3)

Observer rating degree of group organization  
" " " "we-feeling"  
Performance on Rope. Strength of non-shock pull.  
High sociometric count on number of significant members.

Battery for Factor 4. Plodding Morale (Morale III)

Construction (a) long planning time  
(b) constant planning time  
High level of electrified rope pull  
Much learning in " " "  
Guessing game, relatively many questions on difficult items.

Battery for Factor 5. Effective Role Interaction (Morale 1)

High accuracy in Group Judgment (Committee)  
Small number of dots on target test  
High Jury Judgment Suggestibility (Emotional 1)  
(a) Preference for and (b) quickness at cryptograms.

Battery for Factor 7. Frustration by Heterogeneity

Discussion on Interests: High speed of ranking alternatives  
Sociometric count: Large number of negative effectors  
Observer rating: High development of leadership technique  
Little modification of individual attitudes by the group  
Construction: Inconstancy of planning time

Battery for Factor 9. Garrulous Nervousness (Low Morale 5)

Low level of electrified rope pull  
Preference for attitude discussion situation  
" " verbal over motor activities  
Long time on easy questions in guessing game

Battery for Factor 10. Low Reward Synergy (Synergy 1)

Dynamometer (a) Large decrement through shock  
(b) Large learning decrement  
Jury Judgment (a) Greater influence from authority than logic  
(b) Little unanimity in original decision  
Observer Rating: Low degree of group frustration

Soc. Count: Little satisfaction with leader  
Observer Rating: Low degree of group participation

Battery for Factor 11. Rigid Deliberation

Jury Judgment: (a) High suggestibility (speed of later decisions)  
(b) High volume of argumentation  
Construction: (a) Low speed of construction  
(b) High constancy of aspiration  
Observer Rating, High degree of frustration

Battery for Factor 12. Low Organization, Fatigue

Guessing game (a) Long time on easy items  
(b) Many questions on easy items  
Interests discussion (a) Inconstancy of decisions  
(b) Little concentration of votes  
(c) Slow speed of voting  
Observer Rating: Little interpersonal conflict

The above batteries involve as a rule setting up two or three test situations only, since more than one measure is often obtained from each, and thus should take rather less than an hour per factor. The scores on each test are, of course, to be put in standard form before adding for the total battery score.

3. Opportunities for Further Research Gains.

Any research worth its salt opens up in its progress findings which provoke further research; but we venture to suggest that the present research is particularly rich in indications of new avenues of profitable study. Here we propose to formulate a few of these. They can be pursued not only by (1) the setting up of new experiments, tailored to the more precise indications from this research, but also (2) the making of further statistical analyses of the present data which, for lack of man-hours, we have had to forego.

In order to keep essentials in perspective let us formulate the principles involved in our findings in three equations, as follows:-

(1) The syntality specification equation:-

$$P_{gj} = S_{1j}F_{1g} + S_{2j}F_{2g} + \dots + S_{nj}F_{ng} + S_jF_{jg}$$

Where  $P_{gj}$  is the performance of group  $g$  in situation  $j$ ; the  $S$ 's are the situational indices for the situation  $j$ ; and the  $F'_g$  are the dimensions of syntality for groups of that kind, given for particular values for the given group  $g$ .

(2) The individual persons specification equation

$$R_{ij} = s_{1j}T_{1i} + s_{2j}T_{2i} + \dots + s_{nj}T_{ni} + s_jT_{ji}$$

Where  $R_{ij}$  is the response of the individual  $i$  in the group situation  $j$ ; the  $s$ 's are the situational indices of the group situation  $j$  for individuals; and the  $T$ 's are the source traits of personality with values as measured for the individual  $i$ .

### (3) Transformation equation from group to individual situational indices

$$s_{1j} = f(S_{1j} + S_{2j} + \dots) (F_{1g} + F_{2g} + \dots)$$

(This equation is not in final and tried form as are (1) and (2). It states that the individual situational index for j for a given trait is a function of the group indices for the given situation and of the syntality dimensions of the given group. If this transformation can be worked out it will permit prediction of the individual's behavior directly from knowledge of his personality, of the character (atmosphere) of the group in which he finds himself, and of the definition of the situation which the group is facing. Before work on this transformation equation can be effectively undertaken, however, it will be necessary for experimental research to define the values in equations (1) and (2) with greater accuracy than has been marked in this study. For it must be recognized that in an exploratory research of this kind, breaking new ground in both method and data, we are bound to emerge only with the first rough-hewn outlines. Most of our findings now call for that painstaking precision research in restricted areas which was not possible with so vast an area of observation as we had to structure in the initial research.

Thus the first need in further research is a checking of the factor structure and of the situational indices obtained above. This could be done on a more restricted set of variables than we were forced to use in exploration, and could thus be carried out with an expenditure of only about half the man-hours of this major research. At the same time new variables well chosen to clarify the meaning of the factors found could be added, that the stability and meaning of the factors could be simultaneously enhanced.

Before passing from this primary research need to other indicated experiments it is perhaps best to pause and ask what new relations could be investigated in the present stored data without recourse to further gathering of data.

What is to be gained here is far more than a mere raking over of the half extracted ore of a substantially completed research. The funds made available by the ONR committee for the present research were in fact exhausted by the Herculean task of testing 1000 men on all major aspects of personality and then in running the complexly organized circus for recording the performance of over 100 groups each for three half-day sessions. With the exhaustion of resources the funds of the writer's own laboratory were thrown in to complete the factorization of the three matrices of about 90 variables each. Any committee even dimly familiar with correlations, factor analyses and rotations will realize that this alone is normally a three year task for two men working full time and but for the invention of new I.B.M. techniques would have been so in this case. Even with the attainment of this degree of 'closure' the research extraction has nevertheless stopped in mid-career. Almost exactly one half of the possible relations which were intended to be investigated by the design of our experiment have been investigated. The rest, as set out below remain to be abstracted.

A. 1. Factorization of the variables on the combined three sessions, giving higher reliabilities on the principal variables (because measures will now be longer) and greater definition of factors.

2. A search for significant differences in the personalities of leaders chosen by groups respectively (a) high and (b) low on the various syntality dimensions. This is the beginning of investigation of equation (3) above: the changes of individual behavior brought about by measured changes in group atmosphere.

3. An analysis for significant differences in the frequency of various interaction processes in the group with leaders of various personalities. This discovers, among other things, the proper adjustment of leadership techniques to the personalities of leaders and followers.

4. An analysis for significant differences in the frequency of various interaction processes in groups high and low on various syntality dimensions. This would greatly increase our understanding of the mechanisms producing these dimensions.

5. A variety of change scores from the first to the third session, which may be either maturation or learning, remain statistically unanalysed. They are: (a) changes in syntality dimension magnitudes from the first through the third session i.e. in what dimensions does a group normally grow by experience, (b) changes in interactional frequencies, including leadership techniques, from the first through the third session, (c) changes in the four relationships already investigated statistically here.

In regard to (c) we should remind the reader that the four analyses already made are: factorization of variables; distinguishing the personality factors of leaders; personality factors and syntality factors; personality factors and interaction frequencies. Of the six theoretically possible relations, one, -- syntality to personality factor scores -- has been looked into, a second -- personality factor population to leader personality remains unchanged by reason of our design. This leaves for investigation of time changes (i) relations of interaction frequencies to syntality factors (ii) relations of syntality factor changes to personality of leader (teaching capacity of leaders) (iii) relation of interaction frequency changes to population personality factor (iv) relation of interaction frequency changes to leader personality. These constitute material for a basic investigation of group learning.

It may be doubted whether any body of data so suitable as the present (in objectivity and size of sample) exists anywhere today as a basis for the above analyses, and it is to be hoped that funds will be expended in deriving these relations from the scored, indexed results here rather than by the ten-fold greater expense of starting fresh experiments.

Turning now to the clarifications which can only be obtained by fresh experiments the following may be suggested:

B. (1) First, any use in other researches of the test batteries for group dimensions suggested above is likely to add to our knowledge of their meaning. Specifically, however, it is now desirable to search for new variables of higher saturation with the battery pool than any present members of the battery, and to see how the above dimensions change in magnitude with size of group, motivation, length of time living together, group success and failure etc.

(2) Most importantly of all, as argued above, a fresh sample of groups should be used with the same variables (plus those indicated to test hypotheses regarding dimensions, discussed below) to determine the stability of the syntality factors and the convergence of independent simple structure rotations.

(3) The immediately indicated extensions of the group description and measurement work are to groups of different sizes, ages, motivations and structures. Notably one would like to see similar factorizations (a) of groups of three people (neonate) (b) groups of ten which have been in team work together



over several months, (c) groups of ten with more complex role structure and (d) a group of ten with stronger motivation. We suspect that some of our major factors would persist among all these group species.

A logical subdivision of 3(c) with great practical importance is the dove-tailing of research on experimental groups into that on groups-in-being in institutions. This requires factorizing the group dimensions on sets of variables consisting about equally of (i) measures gathered by putting the group to experimental tests on marker items from the above factors and (ii) measures from the recorded efficiencies, interactions (structures) etc. of the group performing its required institutional acts in situ.

(4) A whole series of researches are indicated on the present syntality and personality factors in relation to what has been called "group learning" (8a) (15). A few of these are possible from our present data, as suggested above, but our design was mainly cross sectional and cannot give full answers about longitudinal changes. For example, the trend of the stability coefficients can be glimpsed here, by a comparison of two intervals, whereas it would be most interesting to know whether the stability of group characteristics climbs to a plateau and if so at what final level of reliability coefficient and what "session-age" of the group. Again, no adequate comparison can be made in our groups between the leaderless and the leader-directed condition, because we have no reversion to leaderlessness at later ages, to rule out the learning effects.

Some of the group learning effects have been captured by an analysis of variance design by Penman (15), but the following (expanding A5 above) need investigation in any systematic advance.

- (a) Changes in syntality traits (learning) related to initial syntality and population characteristics.
- (b) Changes under various strengths of motivation and reward.
- (c) Changes in groups subjected to varying degrees of success and failure.
- (d) Changes in groups subjected to varying degrees of out-group hostility.
- (e) Changes in groups having varying degrees of overlap with other groups.
- (f) Changes in groups having different internal structures, notably as to leadership, level of internal communication and the manner of distribution of group rewards.

The learning experiment design could ideally be combined with the cross-sectional descriptive design, in that the factorization of syntality dimensions of mature, established, experienced groups could be carried out on the groups put through these experiences, with resultant possibilities of relating the discovered dimensions to the experiences.

Beyond the above perfectly definite relational investigations which systematic research requires there are other researches which will suggest themselves to anyone studying the hypotheses provided by our syntality factors. For example, our initial theories about the principal components in synergy are in the main supported, but also rendered into more specific and precise hypotheses by the present findings. There now appear to be at least three main factors to be taken

into consideration in estimating synergy. First there is the synergy resulting from the external rewards to be gained from working in the group (Reward Synergy: Factor 12(-)). Secondly there is a somewhat modified picture of what we called intrinsic synergy i.e. satisfaction through the group life itself. This, as Factor 1, seems to be connected largely with the goodness of the leadership, which presumably augments both the harmonious satisfactions in the group life itself and the clear perception of (or optimism about) the group goal rewards. Thirdly there is an augmentation of synergy, presumably most conspicuous in the early hours of the group's existence, arising from favorable personality factors in the population-(-intelligence, emotional maturity and absence of paranoid trends-)-which facilitate a rapid, realistic use of the group as a means to goals. This three-factor theory of group synergy will suggest a variety of specific researches for its testing and extension.

By the common use of the term "Morale" to group dynamics our findings indicate that it is a resultant of no fewer than six distinct factors. Many specific researches could be initiated to test this hypothesis and to clarify the mechanisms of these separate "morales" implied by the titles we have given them.

Again our finding that heterogeneity in population on some temperament factors raises the level of group frustration has important implications for studying group aggression. Our hypotheses here is that heterogeneity in some personality factors e.g. intelligence, cyclothymia--schizothymia, may be desirable where the group life requires a certain variety of performances, but that on others, principally determining attitudes and modes of interaction e.g. N, M, L and I, heterogeneity is productive of frustration in communication and in arriving at consensuses on group activities. This also suggests a number of experimental designs breaking down the question of heterogeneity effects into more specific questions.

It is perhaps unnecessary to stress that all advances in these group hypotheses must go hand in hand with improvement in objective group measurement techniques and increasing understanding of the meaning of individual personality factors.

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## APPENDIX 1

### THE MATERIALS USED IN THE EXPERIMENT

- A. List of Situations so Described  
as to permit Reproduction.
- B. Manuals used in presenting  
Situations to the Groups.
- C. Instructions for Observers  
(together with rating sheets).
  - I. For assisting Experimenter  
and making ratings.
  - II. For classifying interaction  
behavior.
- D. Description of the Sociometric  
Data Forms.

## APPENDIX I

### THE MATERIALS USED IN THE EXPERIMENT

#### A. List of Situations so Described as to Permit Reproduction.

## BRIEF DESCRIPTION OF SITUATIONS SO DESCRIBED AS TO PERMIT REPRODUCTION.

### 30. Construction:

The group was asked to construct a three dimensional figure using dowel sticks with two different size ends and of two different lengths, and a limited number of cubes drilled out to receive the sticks. A diagram showing only the shape of the required figure was presented. The group was given a distribution of scores (time for completion) and asked to submit an estimate of its time before beginning work. It was then allowed up to 2-1/2 minutes to decide upon an estimate. If it did not submit an estimate in less than 2-1/2 minutes, it was asked to do so; if it did, it was told that it will be timed beginning when anyone touched the materials. If however, they had talked beyond the above limit they were asked to begin. When the model was submitted, it was inspected for completeness. If it was not finished in 10 minutes, the group was asked to stop; and they were given credit for (and told) the amount completed. They were then asked to repeat the above procedure, again building the same figure. A different figure was used for each session. The repeat construction was not done in Session III (except in the first 35 groups). The group was told that its score was the time taken to complete the figure, or in the event it did not finish it, the amount achieved.

### 31. Group Judgment:

The group was given, one at a time, 4 questions of fact, e.g. "what was the ideal minimum subsistence budget in 1939 for a family of 4". They were allowed 2 minutes to discuss each and required to submit an answer at the end of that time. They were told that if a correct answer was submitted in less than 2 minutes, they would receive a bonus that increased as their time shortened. (The situation was used in session I and II).

### 32. Attitudes:

The subjects were given a 21 item attitude scale consisting of statements taken from the Thurston scales on birth control, evolution, God, war, and Communism. Below each statement was a 7 point scale on which the subject could check his agreement with the statement (ranging from "absolutely certain" to "absurd"). Eleven of these statements were presented to the group (2 at session I, 3 at II and 4 at III, the latter for the first 36 groups only) as "sentences taken from recent American or foreign newspapers". They were then told that the group was to discuss each statement for four minutes ("Decide what the statement means and how you feel about it"); and at the end of each 4 minute period the experimenter would ask the members to vote (by show of hands) on the (same) seven point scale. The average of the membership vote would be considered "the group opinion". The group was told that they were given points for the number of ideas discussed and "the general liveliness of the discussion". At the end of the situation the individual member was again asked to indicate his opinion on each question discussed as a part of the sociometric measurements for that situation.

### 33. Guessing game:

The experimenter answers with either "yes" or "no" questions asked by the group who are instructed to try to discover of what it is the experimenter is thinking. They were told that they were limited as to time but not as to the

number of questions and that their score was cut more by an excess of questions than by lack of speed. At session I their problem was to discover an "easy" item (the Eiffel Tower) and a "very difficult" one (the concept of goodness). At session III they were given an "easy" item (Ingrid Bergman), a "difficult" one (the city of Columbus, Ohio), and a "very difficult" one (the visible solar spectrum). The time limit (not told to the group) on each item was three minutes.

#### 34. Dynamometer: (used for the last 40 groups only).

Two steel pipes, 1 inch by 30 inches, were placed at each end of a small steel dynamometer. The group members were given pieces of canvas to fit over their shoes and were placed on a heavily waxed floor. They were told that they had 30 seconds to get the dynamometer hand as high as possible, that their score was the dynamometer reading, and that the best way to proceed was by jerking. After they had worked for 30 seconds, their score was read to them. They were asked to estimate what they would do on repeating and then were told to repeat the task.

After this had been repeated, the dynamometer was modified so that it gave a continuous reading. The group was told that they were now to maintain as steady a pull as possible for 15 seconds and that the lowest point they allowed their pull to fall would be their score. No practice trials were permitted, but as much time as desired was allowed for planning and organization. After doing this once, they were asked to estimate and then repeat the trial as above. This situation was used in this form in session I only.

#### Dynamometer with Shock:

For the last two sessions, this situation was modified in that only the second type pull (steady) described was used. The group pulled 4 times, each for 15 seconds. After each pull, the minimum strength was announced, an estimate of the next pull was obtained, then attempted. The metal handles were replaced with fiber handles of the same length, each with five hand holds. In each hand hold two electrodes were so placed that it was impossible to get a firm grip without contracting them. A high voltage current was placed on these electrodes during the last three pulls at each session. The dynamometer situation was used for the last 45 groups only.

#### 35. Interests:

Immediately after the attitude test was given and just before the group was to begin functioning as a group, each member was asked to indicate the relative strength of his interests at that moment in a list of 11 activities selected so as to (1) involve as many as possible different basic human needs and (2) vary in the amount of interaction likely to be involved in doing them. About two hours later the entire group was asked to discuss the same list of possibilities, apparently for the purpose of selecting one of them as a subject for a future meeting. After discussing the possibilities for 6 minutes, the group ranked them in order of preference, and finally cast 100 votes divided among as many activities as it wished. The need for voting as well as ranking was explained as a device to allow the group to indicate relative strength of its preferences in competition with other groups. Following this, as a part of the sociometric ratings, the original "interest" form was again filled in by each member with instructions to indicate "how you now feel".



### 36. Card Sorting:

On the front side of the experimenter's table was placed a sheet of heavy cardboard, 11 by 42 inches, divided into 15 squares numbered 5, 10, . . . 85. Above some of the squares "red" was printed, above others "black", and above still others there was nothing. On this cardboard a stack of specially selected playing cards (without face cards) was placed. The group was told that their task was to sort this stack of cards into 15 piles each placed in the appropriate square. They were told that there was a time limit but not what it was (6 minutes) and that their score depended on both speed and accuracy.

### 37. Discussing and Planning:

The final activity in each session was described to the group as an opportunity for it to discuss what it had done, how it could have done better, what things it found most interesting, what it disliked about the experiment, and so forth. This discussion was allowed to run for 6 minutes immediately after which the group (for session I and II) ranked its preferences of situations.

### 38. Jury Judgment:

The group was given brief summaries of several rather involved law cases. They were asked to discuss the case for not more than 5 minutes, then report a verdict (a simple majority was required). As soon as the verdict was reported, the experimenter then gave them arguments based, for different cases, upon appeal to authority, logic, or emotionality appeal designed to disagree with their verdict. Unless a group reversed its judgment, 3 such arguments were read for each case and up to 5 minutes discussion was allowed for each argument. The group was told that it was scored on the soundness of its reasoning. Sessions II and III were opened with this situation.

### 39. Target throw:

The group was told that this situation was designed to measure the effect of the experimenter and observer on its performance and as soon as the instructions were presented, the two left the room. A multi-colored canvas target with circles marked from 10 to 0 placed high on the wall was pointed out to the group. All members were told to stand on the distant side of the red line on the floor. A squash ball was given to the group, and it was explained very specifically that they were to have 10 throws at this target with the squash ball. There could be no practice shots at any time. The members were to watch where their throws hit and to report to the experimenter the total score at the end of the problem.

Unknown to all groups there was a carbon paper and a recording sheet beneath the target so that the exact number of throws and number of points earned could be ascertained. This situation was used in Session II and III for the last 45 groups collected.

### 40 Crypts:

The group was given instructions in breaking four kinds of codes. They were then presented with four coded messages, one at a time, and asked to solve them as rapidly as possible. Three minutes were allowed for each.

#### 41. Leadership selection:

Immediately before leaving at the end of session I the experimenter invited the group to select a leader for the beginning of the second session. No instructions were given as to how the selection should be made, nor what criterion of election was required. He then waited for the group to announce its decision.

At the start of session two the experimenter stated that since the group may have changed its mind, since its last meeting, about who it wished to select as leader, a new election would be held. This time the experimenter asked that votes be cast by writing nominations on a slip of paper and he volunteered to collect and count them.

A new leader was elected at the end of each hour during session II, and at the end of session II, a leader was elected for the entire third session.

## APPENDIX I

### THE MATERIALS USED IN THE EXPERIMENT

- B. Manuals Used in Presenting  
situations to the Groups.

## Manual of Experimenter's Instructions

### Session 1.

When the group enters have them remove coats, etc. Ascertain that they have no more than recent acquaintanceships and sit the ten men. Then say--

The purpose of this experiment is to discover laws of social psychology. These laws are badly needed today by business men, statesmen, and the armed forces. For example, in the event of another war the Air Force might have to pick many bomber groups. If we can find out something about why people do what they do when they work together, then the Air Force can use this information to pick better groups and to train them more quickly.

To discover these laws we need to know three things: the members of the group; what the group does; and what the members of the group think of what it does and of each other. You have already told us something about yourselves in the personality tests. We now will find out what the group itself does by watching you, and we have prepared rating scales which are to be filled out by you after each group activity. This will tell us what you think about your fellows in the group and tell us how you judge the group.

Remember we are interested in the group rather than in individuals and we are interested in what the group does and why it does it; therefore, it is important that each of you answer all these questions as honestly as you can. Because we are now going to ask for your true opinions about what the people in the group with you do as the experiment unfolds, we think that you are entitled to an assurance that this information will remain highly confidential. So throughout the experiment you will be known by number rather than by name and will be recognized also by your coat color. Within this group you will have a number between 1 and 10. It is this number that will identify you and by which others may continue to refer to you within this group. It is this number which is on the arm-bands which are on the backs of your chairs that we can all recognize you and you can recognize each other.

You will find these group activities interesting in themselves, you will also find the whole program interesting as an example of very recently developed research in social psychology, at the conclusion of the program we shall explain to you what it is that you have done and what we have learned about group behavior as a result of your participating here. In addition to all this we want you to feel that there is something in it for you as individuals--there is education in it, of course, but somehow students seem more interested in a few handy dollars than in education, so we have prizes which will be awarded to groups on the basis of the group performance, a group may do what it wishes with that prize money, spend it as a group or split it up among its members or do anything at all - it's yours when win it. There is a prize of \$100 for the best group in each set of 10 in the whole experiment. At the beginning of each problem I will tell you how you can earn points for each particular situation.

Now briefly notice the questions on the first page of the record booklet. The numbers (one to ten) near the top and at the bottom of the page represent the members of this group. Where ever there is a divided line, like the three on this page, you are to draw a line through it at the point which most nearly corresponds to your judgment.

Will you notice the upper right corner of the form being handed you. Fill in your number on the record sheet. Opposite "group" write \_\_\_\_\_. Opposite "group no." write \_\_\_\_\_. The date is \_\_\_\_\_. This same information should be filled in on all forms given you. It is the only identifying information they will bear.

Now read the printed instructions on this sheet with me.

READ INSTRUCTIONS AT TOP OF INTEREST SHEET.

Do you understand?

You have three minutes to fill in this sheet. Go ahead.

### INTERESTS

We now want to know how interested you are in each of the following activities. Suppose you have \$1.00 to spend on them. By showing how much of it you would be willing to spend on an item, you can show how interested you are in it. Do not try to decide how much they would usually be worth to you, or how much they would actually cost. Think only of what part of the dollar you would be willing to spend, right now. You must spend the entire dollar. Fill in each blank.

## CONSTRUCTION - INSTRUCTIONS

Materials: Stop watch. Building Materials. Diagram of model.

Here are a number of sticks and some joint pieces. You are to use these to construct a model that will look like this (show wall drawing). Do the job as quickly as possible. The group score will be in terms of the time you take to do the job - or if time runs out on you - in terms of how much you have completed. Notice that there are two lengths of sticks. The short sticks are just alike on both ends, but the long sticks have different size ends. (Demonstrate) Notice also that the blocks are of several different kinds--some have all small, some have all large, and some have both kinds of holes. In this figure only the upright sticks are short ones. All other sticks are long ones.

Before you begin we would like to have you estimate how long you will take. We have found that groups of 10 (substitute here the number actually in the group) men can build this model on their first trial in an average time of six minutes. One group in twenty takes 2 minutes or less while one in twenty takes ten minutes or more. How long will you take? (group to make estimate)

(Observer should note the discussion that follows this, classifying it on the tab sheet, while E. times the interval between his putting this question and the group's giving him an answer. E. should, on the blank sheet, describe briefly the atmosphere and behavior of the group in arriving at this decision. If discussion becomes prolonged--over 90 seconds--and deviates from the problem, E. should remind the group of their problem).

As soon as the estimate is given, E. says, "I'll start timing you as soon as you touch the materials". (If group goes into a prolonged discussion of procedure, interrupt them at 1-1/2 to 3 minutes--depending on how much time was spent in arriving at a time estimate--by, "Time is in").

As soon as the group has completed the model, presented it, and it is accepted by E. (for E. to accept it all blocks must be properly placed) E. says:

Now dismantle it. (E. should help. As soon as members have returned to their chairs) he says:

Your time was \_\_\_\_\_, If you were to repeat the same task right now, how long would you take for a second trial?

As soon as an estimate is given, indicate that they are to build it again, similarly. Smile if asked how time is going but admit they are being timed. Allow not more than 2 minutes discussion before starting them.

During the working period E. should write a description of how the group proceeds, noting who is participating, who is "pushed out", who leading, how they handle problems, nature of interaction, etc. O. should tabulate vocal behavior on the classification sheet. At the conclusion of the second trial, have the members privately fill out the rating scales while you also fill out the observer rating scale.

In this situation, record

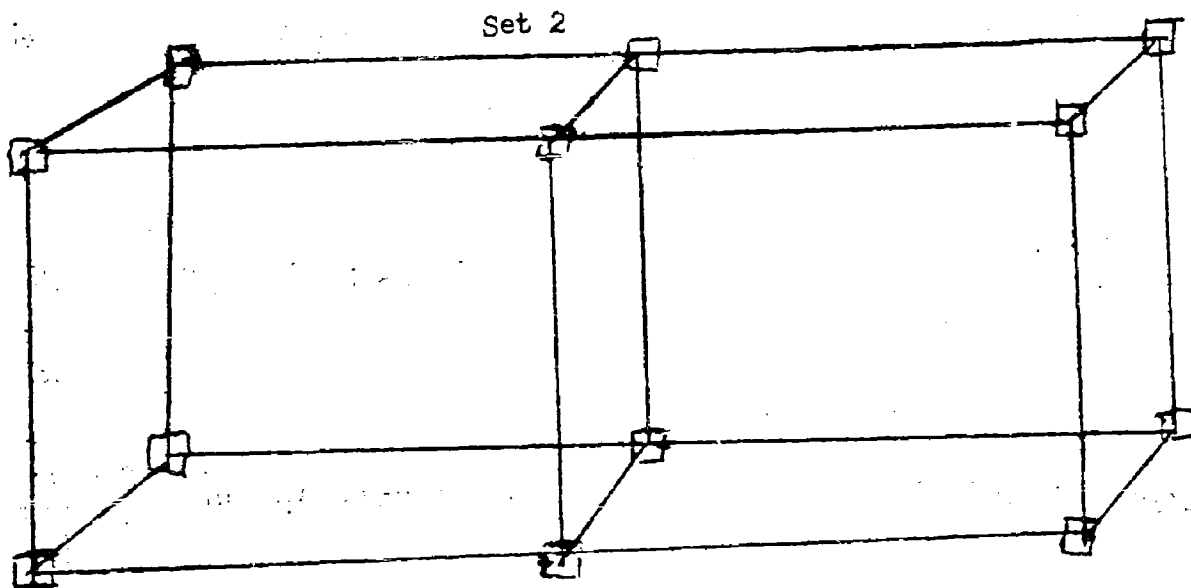
1. 1st estimate of time, who reports it, and how long the group takes to decide;

2. Time spent in planning, if any:

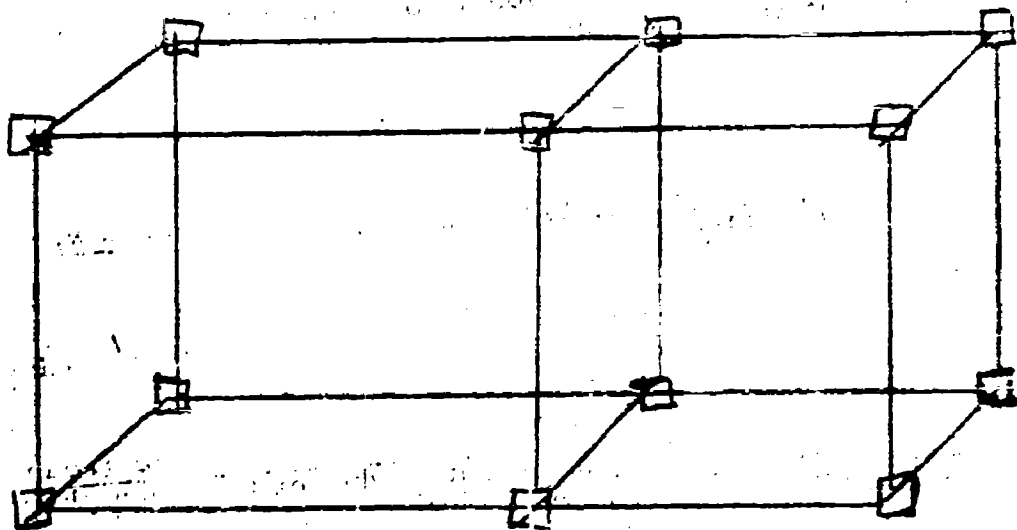
3. Construction time

for each trial.

Note: Allow no more than ten minutes for either trial to complete the figure. If figure is incomplete at the end of ten minutes stop the group, count the number of faces finished and report this to them. Any corner block which is missing will make three faces incomplete, a center block may involve five, etc. This figure has 11 faces when complete.



(longer rods vertical)



## SITUATION II

### GROUP JUDGMENT - INSTRUCTIONS

Materials. Stop watch. Scribbling pads.

Have the subjects seated so that discussion is easy. Explain that this is an experiment to discover whether group discussions can be recorded and analyzed satisfactorily and we are interested to find out how well groups of people discussing together can answer questions of various kinds. Then say --

You will be given one at a time, 4 general questions. For each, two minutes only will be allowed. At the end of this time we want you, as a group, to report one, and only one, answer to the question. How you do this is entirely up to you. Your group score, upon which your chances for the prize money depends, comes from your accuracy and from your promptness in answering. Start recorder.

The first question is - What was the ideal minimum subsistence budget in 1939 for a family of four? (Record as before)

The next question is - What is the present white population of Alaska? (Record as before)

The next question is - Where and when was atomic energy first produced by man? (Record as before)

The final question is - What is the basis of most, if not all, commercial dentifrices, or tooth pastes? (Record as before)

Do NOT tell whether the answer is correct, do not delay to discuss with the subjects any differences they may have or questions they ask. No questions should be answered.

At the conclusion of the whole situation say "rating scales, page 2". On this situation both E. and O. should fill in the discussion classification sheet. If the group asks for time to organize itself to handle the situation this request should be granted but they should be allowed no more than two minutes to do this. E. should record on the blank page the exact circumstances of this, noting who makes requests, how group responds and what is decided (to do this may necessitate sacrificing part of the classification sheet. If so a note should be placed in the margin indicating what part is not recorded.)

The group product (answer) should be recorded as follows:

1. "\$1200 per year" (P) 1'39"

NOTE: If a group does not have an answer by 2 minutes, stop them, and ask for the answer. Record how answer is arrived at under these circumstances, and the excess time that is used. This time will be used as an "acceptance of limits" score.



### SITUATION III

#### ATTITUDES

Materials: Pointer, cardboard voting scale, ten copies of attitude statements, timer.

Procedure: Pin voting scale on wall where it can be seen by the entire group. Then give each member a copy of the attitude statements.

Directions: Here are five statements taken from recent American and foreign newspapers. We want you to discuss Numbers 2 and 4, one at a time in the way a committee might do. You are to try to decide what the statement means, and how you feel about it. At the end of 4 minutes I will ask you to vote on this scale to show just where you stand with regard to the statement. The position taken by the majority will be the official position of the group. You are not, however, to discuss how you will vote, but rather what the statement means, and how you feel about it.

Your score will be determined by the liveliness of the discussion and the number of points brought out. Now begin with the statement no. 2 and discuss it for the next 4 minutes.

Just before taking the first vote say: Remember, the position (average) taken by the majority will be the official position of the entire group.

After four minutes E. should stop the discussion by announcing that it is time to vote. In taking the vote he should always start at one or the other end of the scale (end to be determined by the group), and move toward the other extreme one position at a time, until all votes have been recorded. The average of the votes should be reported to the group. As soon as this is done they are asked to discuss the next statement, as before, or fill in rating scales, as the case may be.

E. should attempt to get a summary of each contribution, recording this on the blank page. If a recording device is being used, he should record, verbatim, the order of speaking and the first few words of each speech. O. should keep tab of speaking on the classification sheet, and should record, on the blank sheet, the position of individual votes, and the reported "group opinion". For example:

Q. 2. "Criminals are pathol....."

Abs. cert.

Unc.

absurd

3

2

4

2

etc.

SITUATION IV

GUESSING GAME - INSTRUCTIONS

Materials: Sound recorder, - Stop watch.

The subjects will again be seated on three sides of a table. The experimenter will sit at the fourth side. The microphone will be on the table. The experimenter will explain: This situation is a guessing game and it is to be conducted in general as it is on the well-known radio programs, that its object is to find out whether groups differ in their efficiency in performing such a task as this.

Say-

I will think of the whole or part of some person, idea or thing, present or past, and, by asking questions one at a time which I will answer merely by yes or no, you are to discover with as few questions as possible what it is I am thinking of. Your score and your prize depend upon the fewness of the questions and the shortness of the time, but the number of questions is more important than the time. Any questions?

Start the recorder and say - All right let's go on the first one. Ask your questions. (Start watch.)

Here E. should merely keep count (on the counting device provided) of the number of questions. He should of course, record the answers, time and number of questions, etc.

The things to be had in mind here are:

1. The Eiffel Tower
2. President Truman (use this only if 1 is failed)
3. The concept of goodness.

There is no limit to the number of questions. No more than three minutes are to be allowed for any one item.

O. should use the blank sheet, and record the order of speaking as well as many questions as possible, and the final answer.

## SITUATION V.

### DYNAMOMETER

Materials: Dynamometer, unwired handles. Pencil, blunt point, stop watch, canvas shoe covers for ten people, to give constant friction.

With the group members seated in their usual positions give each member two canvas strips and demonstrate how they are to be used. When these are put on, pick up the dynamometer, explaining and demonstrating how it works. (Keep members in their seats during this explanation).

Now say-

You are to use this as a sort of tug-of-war. You should divide up in any way you choose, then you are to pull against each other and make this dynamometer register as high as possible. It has been found that jerking is the best way to do this, but you may not jerk the apparatus - only yourselves. After you have done this for 30 seconds I will say stop and we will read your score. I will then ask you to estimate how well you will do when you repeat it and after you've made your estimate, you may try it again, just as before. You may use only one hand to pull with and you may not hold on to any fixed object. Any questions? All right, get ready and lets go.

When this is done say:

Now that is the first half of the experiment. During the second half, you need to keep as strong a steady pull as possible. The lowest point to which you let the pointer fall during the 15 second period will be your score. Of course, you will want to make a high score. --Well, after doing this you should estimate how well you will do a second time, then we'll try it a second time.

E. should hold the dynamometer seeing that it is held upright and not jerked excessively (since jerking moves the pointer). He should also time the group during the 1st two pulls. O should record how group divides up, who directs division; how they pull and what organizational devices they use. O. must record group products.

For the 2nd (sustained) pulls, O. will have to start and stop the group. E. should place his pencil on the dial bearing down hard enough to leave a mark and pressing gently against the pointer. He should put the pencil there when O. says "Stop".

Record group products as follows:

1st (max) \_\_\_\_\_ lbs.  
estimate \_\_\_\_\_ lbs.

2nd (max) \_\_\_\_\_ lbs.

1st (min) \_\_\_\_\_ lbs.  
estimate \_\_\_\_\_ lbs.

2nd (min) \_\_\_\_\_ lbs.

## SITUATION VI

### INTERESTS I

Materials: Revised list of interests. Group ballot.

Say:

Sometime later you will be invited, as a group, to spend one evening of approximately three hours pursuing one of the following activities. We now want to see what things you prefer, and how much you prefer them. Since all groups will have to do the same thing we cannot guarantee that you will get your first choice. To select the activity that will please the most groups we need to know both what your preferences are and how strong they are. Before deciding your preferences however, you will need to discuss the various possibilities involved in the different activities. Therefore, for the next six minutes you may consider these possibilities. Your score, and your prize, depend on the liveliness of your discussion and the number of ideas you talk about. At the end of six minutes I will ask you, as a group, to vote on the different possibilities. You are not, however, to decide how you will vote yet. Are there any questions?

At six minutes, E. fills out the green ballot step by step, calling for a group decision at each point (but not himself calling for any votes.) As soon as the rank order is determined he announces this, slowly and clearly, then says:--

Now, we need to know how strong your preferences are. You have one hundred votes which you may divide in any way you wish. Remember, the alternative getting the most votes from all groups will be the one chosen. How shall I record your votes?

(Throughout this situation try to note active participants, and both active and passive dissenters.)

## SITUATION VII

### CARD SORTING

Materials: Special pack of playing cards. Base card. Stop watch.

Place the base card on the front of the Experimenter's table. Put the deck on it.

Again in the next task the emphasis is on speed and accuracy, this time in performing a routine clerical task. The materials consist of this bundle of ordinary playing cards (present them).

These are to be sorted as quickly as possible into 15 groups as indicated on this chart. Each group is to have the cards in it adding to the value indicated here (point), and all the cards of a group are to be of the color indicated here (point). Where no color is required the colors may be mixed but in every case the total value of the cards in the group must be as shown. All of these requirements are indicated on the base sheet here and each group of cards when it is completed is to be placed here in its proper place.

Your score depends upon the number of groups correctly assembled when time is called or upon the time taken if you complete the task before time is called. Speed is the essence of the task. Work as fast as possible but also watch your accuracy. For this task in order to save time, your work will not be checked, but we will give you whatever score you say you have earned.

The special rules here are that you may not move the base card, and you may work only from the front side of the table. Time begins when you touch the cards.

O. should keep the verbal behavior tally sheet while E gives a description of what happens, noting particularly who participates, method and extent of organization, carefulness of work, etc.

Score should be recorded on the blank page as follows:

"14 boxes right" (K) Time 3'59"

and the completed stacks set aside to be checked later.

## SITUATION VIII

Materials: Colored group ballot; cardboard list of situations, timer.

Say:

As a final activity for this session, we want you to discuss the whole session's activities. You should try to decide what your own strengths and weaknesses were, and also what were the strengths and weaknesses of the situations themselves. What suggestions can you formulate for a better performance next time. You have six minutes for this. Once again, you will be scored on the number of points you discuss. This card lists the situations in order of their occurrence.

(Set the timer at six minutes and put on table where it will be visible. When it rings say:)

Next time we are going to try to rearrange the program according to your interests. Will you therefore tell me now which four of these situations you prefer, or would most like to have again? (Continue filling out the group ballot.)

(Take and record the time required to complete this ballot). As soon as the ballot is completed say:

Next time when this group meets you will need to have a leader. Please select this leader now by any method you may wish.

Rating for total session . . . . .

Record leader selected and have the last two pages of the record booklet completed.

When members have completed these ratings, E. should remind them of the next meeting, have arm bands removed, and thank them for being there.

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**Session II.**

When the group is seated and coats are removed etc, tell them that this is a continuation of the former session and that they are to be identified again by the same number and color they had last time. Then have them fix arm bands.

Say "Remember again that for the purpose of this investigation you as individuals are essential but unimportant. It is the group we are concerned with and therefore with you as a group-member. When you fill out the rating scales and questions after each situation remember this and be honest and frank. Some of you were inclined to refuse to say which members of the group you would reject --perhaps you would not reject any and that is perfectly all right, but usually we do feel there is one at least in ten of us who would benefit the group by his absence. It may not be the same ones all the time or it may be. That is for you to judge.

This session's activities also contribute to your winning our prize. This is your second chance to do better than you have done or to keep up your high standard. The activities of this session will be some of them like and some of them unlike those you have done before. We hope they are even more interesting than session I. And of course we are getting to know each other better now so our judgments can be made more certainly this time.

It is important to work as quickly as possible because our total time is none too long and because your group score depends on both speed and accuracy.

You will recall that at the end of the last session you chose a leader. In your group that leader was No. .... We have been thinking that during the intervening days you have had time to consider this choice you made, and that you may want to change your minds about it. Will you each therefore take one of these ballots, fold it, and on the inside mark the number of the person whom you would now like as a leader.

Experimenter is to glance quickly over the leadership situation and announce retention of old leader or election of new one. E. is then to say, "He will serve as leader though the first part of this session".

## JURY JUDGMENT

This first situation might be regarded as a test of the group's ability to function as a "jury" or of its ability to arrive at sound conclusions from facts and its ability to reason. One at a time I shall read three real law cases. You are to decide the question given you as quickly as possible. You must report your decision within five minutes, and because of the limit on time, a majority vote will be accepted. The facts you will be given are actual facts and are given in the order in which they were brought out in court.

If group verdict is guilty then read 1a, 1b, 1c below and invite a change of opinion after each. If verdict is innocent read 2a, 2b, 2c inviting change after each.

Actually say when verdict is given: "Now there were some facts subsequently revealed which may cause you to change your verdict".

Whenever the group changes its mind, record this fact and read no further.

II. A and B were engaged in a fight with knives. B was getting the worst of it. At that moment C came along and seeing that B was in distress intervened by shooting and killing A. Is he guilty of manslaughter?

Note: If group reports "Not manslaughter, but murder" assume this to be a "guilt" verdict. When report is "guilty," read 1a, etc.

1a. Any street fight is a public affair, and every citizen is a deputy-in-fact to prevent violence and to protect life and property. Had he failed to intervene he would have been negligent of his responsibility as a citizen.

1b. A was guilty in the first instance in fighting with knives, and therefore he (C) is exonerated by virtue of the fact that A was a wrong doer in the first instance.

1c. He was prepared to meet force with only as much force as he was faced with; this is technically within the law. As he was faced with A with a knife who would have at least wounded him he was prepared only to wound A. However, due to the fact that both contestants in the fight were moving about he could not aim properly and he killed him; but accidentally, as he had not intended to kill him.

2a. He had no business in the fight in the first place. He could have intervened without killing A. For example, he could have hit him over the head with the butt of the gun.

2b. He did not have a permit to carry the gun in the first place, and so in the eyes of the law he was really guilty. This is technically a molem prohibitant -- which means that it is something that is prohibited by law and not something which is by and of itself wrong, which is a molem in se. And one so committed raises a presumption against himself -- as when in an auto accident without a driver's license, you get into more trouble than if in one with a driver's license.

2c. Manslaughter as a charge is generally defined as negligent killing. The criteria is whether or not it was a reasonable and foreseen consequence of his action that he might kill. And it certainly was reasonable and foreseen to assume that if two men were fighting your aim could not be proper and you might kill one or the other; and so he was guilty of manslaughter.



Repeat again for III below.

III. A and B were married. A disappeared. B, hearing upon grounds which she believed to be well founded that A was dead, married C one year later. Sometime thereafter A returned. He sued B for a divorce on the ground of adultery based on her relations with C. Question for you is, will he i.e. will A be successful in his suit on these grounds?

If report is "will be successful," read this:

1a. In the case of Mathewson vs. Mathewson, Rhode Island, 456, the presiding Judge Karren ruled that A could not press his charges on these grounds as B had acted in good faith and in honest belief that A was dead.

1b. Reviewing this case for Ballentines book on Problems in Law, Albert C. Jacobs, Columbia University Law School said that "A will fail as B had acted on the best available information, and after a sufficient and fair length of time".

1c. Edwin B. Schabb, noted lawyer, philosopher, and student of Jurisprudence, formerly of Northwestern's University School of Law, wrote in reviewing a similar case, Valleau vs. Valleau, Paige County, New York: "The suit must fail on the grounds of B's obvious good faith and honest endeavor, and the fact that she wished to return to A upon his return."

If report is "He will fail," read this:

2a. In the case of Mathewson vs. Mathewson, Rhode Island, 456, the presiding Judge Karren, ruled that A could successfully press his case on the grounds that B had not acted in good faith and in the honest belief that A was dead.

2b. Reviewing this case for Ballentine's Book on Problems in Law, Albert C. Jacobs, Columbia University Law School, said that "A" will succeed, as B did not act on the best available information, and did not wait a sufficiently long and fair length of time." (Most states do not declare a man dead before seven years.)

2c. Edwin B. Schwabb, noted lawyer, philosopher, and student of Jurisprudence, formerly of Northwestern University's School of Law wrote in reviewing a similar case, Valleau vs. Valleau, Paige County, New York: "The suit can be successful on the grounds of B's obvious lack of good faith, and the fact that she continued living with C after learning of A's return."

Record verdict, time of discussion, who reports verdict and voting if there was any. Do the same following each argument.

Example:

II. "Guilty" d (w) 3'45" (7-3) (R, G, and W - minority)

IIa. "Still guilty" (w) 50" (8-2) (R and W)

IIb. "Not guilty" (w) 4'10" (6-4) (V, D, B, P)

## CONSTRUCTION

**Materials:** Sticks and joint (include the five joint pieces with "-" marks on them. Diagram of model II, stop-watch.

The next situation is similar to one used in the first session. It is another construction problem. The building materials are the same but the model takes a rather different shape. Once again, in this figure, all upright pieces are short sticks, and all others are long. Again, before you begin to work we would like you quickly to estimate how long you will take. Other groups we have tested require the same time, approximately, for this as for model A in session I. That is, the average time is six minutes for the first attempt, while 1 in 20 takes 2 minutes or less and 1 in 20 takes 10 minutes or more. How long will you take?

(Observer should note the discussion that follows this, classifying it on the tab sheet, while E. times the interval between his putting this question, and the group's giving him an answer. E. should, on the blank sheet, describe briefly the atmosphere and behavior of the group in arriving at this decision. If discussion becomes prolonged--over 90 seconds--and deviates from the problem, E. should remind the group of their problem.)

(As soon as the estimate is given, E. says, "I'll start timing you as soon as you touch the materials." If group goes into a prolonged discussion of procedure, interrupt them at 1-1/2 to 3 minutes--depending on how much time was spent in arriving at a time estimate--by "Time is in".)

As soon as the group has completed the model, presented it, and it has been accepted by E. (for E. to accept it all blocks must be properly placed) E says:

Now dismantle it. (E. should help.) As soon as members have returned to their chairs he says:

Your time was \_\_\_\_\_. If you were to repeat the same task right now, how long would you take for a second trial?

As soon as an estimate is given, indicate that they are to build it again, but smile, without answering if asked if they are being timed. Allow not more than two minutes discussion before starting them.

During the working periods, E. should write a description of how the group proceeds, noting who is participating, who is "pushed out", who is leading, how they handle problems, nature of interaction, etc. O. should tabulate vocal behavior on the classification sheet. At the conclusion of the second trial, have the members privately fill out the rating scales while you also fill out the observer rating scale.

As in session I, record:

1. The estimate of time, who reports it, and how long it takes the group to decide.
2. The time spent in planning, if any.
3. The time to build the figure.

### LEADERSHIP VOTE

Ask each person to take a sheet from their scratch pad, fold it then write on it the number of the person they now want as leader, "for the next part of the program".

In the event that no one receives a majority, report to the group each person who was nominated, and that there was no majority. Then ask them what to do about it. From this point, follow the group's instructions.

Preceding Page Blank

## GROUP JUDGMENT

You remember that in the first session we asked you to solve by discussion a number of questions of fact. With different questions we want to spend a few minutes repeating that. You will again be given, one at a time, three questions. For each you will be allowed two minutes discussion and then you are to report one and only one answer to the question. The group score and the \$100 depends both on accuracy and speed.

The first question is:

Name the four principal languages of the world in terms of the number of persons who speak them. (w. Almanac p. 377)

The next question is:

What is the Smithsonian Institution?

The next question is:

List in order the three States which had the highest yield (in bushels) of oats in 1947. (w. Almanac p. 223)

t tell whether the answer is correct, do not delay to discuss with the sub any differences that may have or questions they may ask. No questions should be answered.

At the conclusion of the whole situation say, "rating scales".

On this situation both E. and O. should fill in the discussion classification sheet. If the group asks for time to organize itself to handle the situation this request should be granted but they should be allowed no more than two minutes to do this. E. should record on the blank page the exact circumstances of this, noting who makes requests, how group responds and what is decided (to do this may necessitate sacrificing part of the classification sheet. If so, a note should be placed in the margin indicating what part is not recorded.)

The group product should be recorded as follows:

1. " \_\_\_\_\_ " (P) 1 "

NOTE: If a group does not have an answer by two minutes, stop them, and ask for the answer. Record how answer is arrived at under these circumstances, and the excess time that is used. This time will be used as an "Acceptance of limits" score.

## TARGET THROW

Here now is a new situation. We call it target practice. You see the target on the wall. You are allowed ten throws with this ball. The ball must actually touch the target to count as a try. Your score and your chances for the prize money, depend on the number of points you make in the ten throws. You will have to keep this score yourselves since this is a test of the way Mr. (name of O.) and I effect your group performance. When you have thrown ten times, write your score on a slip of paper and place it on the table, then fill out your rating scales.

Now the special rules for this situation are:

You have only 10 throws at the target. No practice shots, either before or after! If you wish to practice, throw against the wall over here.

For a throw to count, it must actually touch the canvas--therefore, if your throw is so bad that you miss altogether, it does not count. But on the otherhand, if you accidentally hit the target this will count.

When a throw hits on the line, for example between 7 and 8, it will score 7 unless more than half of the ball is on the 8 side.

When the throw is made, all members of the group must be behind this line on the floor.

Finally, remember, your chances for the \$100 prize depend on the score which you report, and remember that you are competing against other groups for this prize.

You should be able to do all of this by the time the clock rings in 5 minutes.

E. then sets the clock, places the ball on the table, picks up his booklet and (with O) leaves the room, closing the door. If a microphone is being used, O. should go to the listening post and write a description of what he hears, noting particularly, evidences of cheating, and the groups reaction to this. E. may devote this time to setting up the dynamometer situation.

## DYNAMOMETER

Materials: Dynamometer, wired handles, shock generator, pencil with blunt point, stop watch, canvas shoe covers.

With the members in their seats, repeat instructions for the use of the canvas shoe covers, and briefly explain how the dynamometer works. Then continue:

Today the program is somewhat different. We will omit the jerking part and go directly to the 15 second sustained pull. You will recall that you are to pull steadily for fifteen seconds. The lowest point that you allow the dynamometer to fall to during this period is your score. I will then tell you your score and ask you to estimate what you will do the next time. But, before the next pull we will electrify the handles so that it will be impossible for you to pull without receiving a shock. I will test the shock, and you will be allowed to feel it before making your estimate. We will do the "shock pull" three times, each time maintaining a steady pull. Any questions?

Both E. and O. should carefully note individual and group reactions to the announcement of electric punishment. A descriptive paragraph should be written immediately following this situation giving details of the situation, noting especially the effect of the shock on leadership, organization, the variability of pull within the 15 second periods, etc., who withdraws, who shows anxiety reactions, etc.

The group product record should include the score, the estimates, who reports the estimates, and if possible, the time it takes to get an estimate.

## ATTITUDES

Materials: Pointer, cardboard voting scale, ten copies of attitude statements, timer.

Procedure: Pin voting scale on wall where it can be seen by the entire group. Then give each member a copy of the attitude statements.

Directions: This is the Attitude situation again. Each of the statements in front of you has come up for public discussion within the last year. Today you are to discuss statements 1, 2, and 4 for four minutes. After each four minutes, I will ask you to vote on where you stand with regard to the statement. You are not, however, to discuss how you will vote, but what the statement means, and how you feel about it.

Remember, your score, and your chances for the prize depend on the number of ideas you bring into the discussion, and the general liveliness of the discussion. All right, now, start with statement number one, and discuss it for the next four minutes.

Just before taking the first vote say: Remember, the position taken by the majority will be the official position of the entire group.

After four minutes, E. should stop the discussion by announcing that it is time to vote. In taking the vote he should always start at one or the other end of the scale (end to be determined by the group), and move toward the other extreme one position at a time, until all votes have been recorded. The average of the votes should be reported to the group. As soon as this is done they are asked to discuss the next statement, as before, or fill in rating scales, as the case may be.

E. should attempt to get a summary of each contribution, recording this on the blank page. If recording devices are being used, he should record, verbatim, the order of speaking and the first few words of each speech. O. should keep tab of speaking of the classification sheet, and should record, on the blank sheet, the position of individual votes, and the reported "group opinion". For example:

q. 1. The govern. should take . . .

| abs   | cert | unc | absurd |
|-------|------|-----|--------|
| ----- |      |     |        |
| 3     | 1    | 5   | 1      |

## CRYPTS INSTRUCTIONS

Material: Sound recorder, stop watch, 4 crypts, scribbling pads.

With the subjects seated on three sides of a table and with microphone on the table say:

In this next situation you are asked to work together to solve crypts. Cryptography is the art of secret writing. In it, one word or letter or number is substituted for another, or the words are scrambled in such a fashion that they are unreadable. In very simple codes the alphabet may simply be reversed, Z standing for A and Y for B and X for C, and so on. In this system the word class would look like this: xozhh. To familiarize you further with crypts we will give you one of the famous crypts of the Civil War. This one is called the Rail Fence Cipher, and it was used by the Union Army to send messages back and forth. The letters in this code are not changed; they are just scrambled in such a way that they are unreadable. In the phrase, The Rail Fence Cipher, the letters are written in couplets, thus: th er ai lf en ce ci ph er. Then one writes out the first letter of each pair, and then the second: TEALECCPEHRIFNEIHR. In order to break this code the number of letters in it are counted, divided in half and re-written with the first half being written first with large spaces between the letters and the second half written beneath it and under the spaces:

TEALECCPE  
HRIFNEIHR

Then the code is simply forced together, and you have your message. A second basic system takes the first, then the second, then the third, and so on, letters of each word. Are You Here would be: A Y H R O E E U R K T E. When after trial and error it is found that this code is not the alphabet in reverse and not the Rail Fence Cipher, this may be tried. To do this count the number of letters in the code message and try to ascertain approximately how many words it would contain, then set off that number of letters as first letters, spacing them far apart, take the second group of letters as second letters, and so on. The third basic system is called the Horizontal or Vertical Route Transposition Code. Despite its long name, this is really quite simple. First, write the message in a series of horizontal columns. In this message: THIS IS REALLY VERY EASY, it is done in this manner:

THISI  
SREAL  
LYVER  
YEASY

Now take the message off in some such manner as this:

ISHI TLAE RSRE VYLY SAEY

or this:

TSLY EYRH IEVA SEAS ILRY

Also remember that numbers can be used.

You may divide the work up anyway you wish and feel free to discuss and talk freely during the tests. All of the codes will carry a time limit. We cannot tell you how many there will be, but promise you that there will be no more than six.



Each code is displayed upon a card. On the back of this card the solution is given but with each word written backwards just so you cannot inadvertently notice a solution. It is legitimate for this group to use some of these solutions but not others. If you have not solved crypt 1 in about five minutes you may consult its solution for a hint. You may obtain similar hints if you are ready to give up, for crypts 3 and 6. But on no account are you to consult the solutions for crypts 2 and 5.

No information will be given once you begin to work. Are there any questions? (Start the sound recorder)

Here then is the first code. Work as quickly as you can because time again affects your score.

Present the codes in the following order  $I_3; I_1; I_2; I_7$ . (Omit  $I_4$ .) Allow five minutes to get the first code, three minutes for each of the others.

E. and O. should record a general description of the discussion, noting who proposes what, the time intervals that lapse, the ability to divide work in trying different methods and in utilizing the key once it is found.

Be sure to stop the work at the expiration of time. Ask for an answer, record it verbatim, and present the next card immediately.

For example: Crypt  $I_3$ . "Can you solve this" (Y) 2'27" (four words)

$I_3$  Time is Running out.

$I_2$  Thank you very much for your cooperation.

$I_1$  Can you solve this crypt.

$I_7$  Psychologists often do the strongest work.

$I_1$  ORST Pily NOHY RTSA CUEC

|       |           |           |           |           |    |           |    |            |
|-------|-----------|-----------|-----------|-----------|----|-----------|----|------------|
| $I_2$ | 20        | 21        | 22        | 8         | 6  | 18        | 3  | 1          |
|       | 8         | 15        | 5         | 3         | 15 | 21        | 15 | 20         |
|       | 1         | 25        | 18        | 21        | 18 | 15        | 15 | 9          |
|       | 14        | <u>61</u> | 25        | 13        | 39 | <u>25</u> | 16 | 15         |
|       | 11        |           | <u>70</u> | <u>45</u> |    | <u>79</u> | 5  | 14         |
|       | <u>54</u> |           |           |           |    |           | 18 | <u>131</u> |

$I_3$  MITSIEURNINUOGSCKT

$I_4$  15.29 - 29.15.7 - 25.9.27.27-  
21.7.7.11 - 11.3.95 - 23.29.137 -  
29.15 - 21.17.15.19 - 29.23.23.  
17.5.9.29.15.5.

$I_5$  TERMRFUTOOTENS  
OANANECHPLAYRIE  
INFHUITMITIPAE

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17

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## PLANNING

Once again, as a final activity for this session, we want you to discuss the whole session's activities. You should try to decide what your own strengths and weaknesses were, and also what were the strengths and weaknesses of the situations themselves. What suggestions can you formulate for a better performance next time? You have six minutes.

Try to decide how you might improve your performance next time. You have six minutes for this. Again, you will be scored on the number of ideas you discuss. This card list the situation that were done today, in order in which you did them.

(After six minutes, break off the discussion and say:) "We now need to know what things you preferred as a group. To discover this will you first tell me which four of the activities you like best. (Continue from here to fill out the ballot.)

Ask the group to make the final ratings in terms of the whole session activities, and to do so very carefully.

At the conclusion of the meeting, after all members have gone, check the target score, and record this on one of the two blank pages at the end of E's booklet. On the other page write any further comments that may be helpful in evaluating the group.

MANUAL OF  
EXPERIMENTER'S INSTRUCTIONS

SESSION III

As an introduction repeat in all essentials the introductory remarks of Session II but do not now offer any change of leader. Remind them whom they chose last time and say to him directly--"You are therefore the leader of this group for this session's activities, you may use that position as you wish".

Then proceed to the first situation.

## JURY JUDGMENT

Again this session we want to start off by having you simulate a jury of ten. We will ask you to listen to two more real law cases and to judge them as you did before. You will recall that this particular task tested your ability as a group, to arrive at sound conclusions from facts in the way a jury does. Again, after reaching your decision on the basic facts of the case as they came out in court, you will be given several other known facts and asked then to judge the bearing of these facts on your decision.

Then say: "Here is the first case for today." Present the cases below in order and read the appropriate additional facts as necessary.

### Cases:

1. Mrs. A., Mother of two young children, stood at the window of her home watching the children cross the street on their way to school. As they started across in response to the signal from a traffic officer, a heavily loaded truck driven by B at a negligent rate of speed ran through the traffic signal and was apparently about to crush the children. They jumped to safety and continued on their way, breathless but unhurt. Mrs. A, upon seeing her children apparently about to be killed, fainted and fell to the floor, suffering a severe brain concussion and breaking her arm. May she recover from B?

### IF VERDICT IS CANNOT RECOVER, READ THIS:

1a. In the Harvard Law Review, 1033, the case was quoted in this manner: This question is one which has arisen several times lately and has met with diverse answers from the court. If the state is one which allows for recovery following physical injury from nervous shock, then A may recover"....."Whether physical injury can take place from nervous shock is no longer a question in science, and injuries so incurred from the negligence of the defendant should be logically recoverable."

1b. Ralph Bauer, reviewing a similar case, Waube v Warrington, Wisconsin 603, says, in the University of Chicago Law Review that "In this well-considered case the difficulty arose from the defendant's failure to use care in his duty, and so from his liability for negligent acts.....the plaintiff, it is felt, can recover."

### IF VERDICT IS CAN RECOVER, READ THIS:

2a. In the Harvard Law Review, pp. 1033, the case was quoted in this manner: "This question is one which has arisen several times lately and has met with diverse answers from the courts. If the state is one which does not allow for recovery following physical injury from nervous shock then A may not recover. Whether physical injury can take place from nervous shock is a question for medical science, not jurisprudence, but injuries not occurring from the direct contact of negligence should not be logically recoverable."

2b. Dean Wigmore, greatest of the living authorities on evidence, says in the Yale Law Review: "The Plaintiff, A's recovery is limited to the harm done by the impact, and not to the suffering occasioned by fright." Hence, A cannot recover.

2c. Ralph Bauer, reviewing a similar case, Waube v Warrington, Wisconsin 603 says: "In this well considered case the difficulty arose not from the defendant's failure to use care in his duty, or from conscious negligence on his part . . . . and so it is not felt that the plaintiff can recover."

II. P, plaintiff, stood at the end of a railway station platform awaiting the arrival of a train. Two of the defendant railway company's employees were assisting X, a passenger, running to board another train which was just departing from the other end of the station. In so assisting the passenger, X, the two defendant railway employees carelessly knocked from under his arm a small package which contained, unknown to them, fireworks. The package fell to the tracks and the fireworks exploded. The shock of the explosion threw down a pair of scales on a weighing machine many feet away, but near where the plaintiff was standing. The plaintiff was injured by the falling scales. Can she recover from the defendant railway company for this injury?

IF THE VERDICT IS CANNOT RECOVER, READ THIS:

1a. The scales must have been loose in the first place or else they would not have been so easily and readily jarred.

1b. The railroad is a common carrier and as such has an absolute liability, regardless of negligence, to any passengers or prospective passengers. (Negligence does not mean the passenger can be negligent; it means that the railroad can be sued without being itself negligent.)

1c. The railroad stood to profit by her being there, and it is only fair that they assume some responsibility for something after all which was not her fault.

IF THE VERDICT IS CAN RECOVER, READ THIS:

2a. The criteria, as always is whether a consequence is reasonable and foreseeable. And she cannot collect because she was not the person who might reasonably and foreseeably have been injured by any negligence on the part of the railroad employees.

2b. It is not reasonable to assume that passengers would carry around boxes of firecrackers, and so the employees could not foresee that they might be running some danger.

2c. The woman had no business around the weighing scales. Passengers are always cautioned against standing around where there might be loading, and so she was in the wrong in the first instance. How can she hope to collect then, when in the first instance it was she who was in error?

## CUESSING GAME

This situation occurs again for a special reason. We will present it just as we have done on the first meeting. You will ask your questions and I will answer them. Remember again to aim at having as few questions as possible in the shortest possible time.

As before, there is no limit to the number of questions you may ask, but there is a time limit.

Let's go on the first one -

(Ingrid Bergman) (blond, not Am. Citizen, dramatic actress)

Count the number of questions, invite giving up at 15, 20, 25 and 30 and stop the process at 3 minutes.

The next thing to have in mind is:

(The visible solar spectrum) (Rainbow, is adequate here, if it is clear that the solar, chromatic aspects are implied.)

The third thing is:

(The city of Columbus, Ohio.)

Record as before.

## CARD SORTING

Our next situation is card sorting again. As before these cards are to be sorted as quickly as possible into groups having the qualities indicated on the base sheet here. Remember each group must add to this sum, must have the color indicated and must be placed here on conclusion. Speed is the essence of the task, so let's go!

Record as before noting method of working, degree and kind of organization, who works, who supplies ideas, degree and kind of leadership, by whom it is given and so on.

The time limit should be adhered to rigidly. It is six minutes.

As soon as group indicates that they have completed the task, ask them how many are "right". Record this answer, noting that it comes from the group. Later, after all members are gone, verify the count. Record this on the last page of the booklet, together with the target score.

O. should attempt to categorize procedure while E. writes as complete as possible description of procedure and role behavior.

### PLACE CARDS HERE

|           |       |     |    |       |    |       |     |     |
|-----------|-------|-----|----|-------|----|-------|-----|-----|
| Group No. | 1     | 2   | 3  | 4     | 5  | 6     | 7   | 8   |
| Color     | Black | Red |    | Black |    | Black | Red | Red |
| Value     | 15    | 20  | 25 | 30    | 35 | 40    | 45  | 50  |

Cards

|           |     |       |    |       |    |     |       |
|-----------|-----|-------|----|-------|----|-----|-------|
| Group No. | 9   | 10    | 11 | 12    | 13 | 14  | 15    |
| Color     | Red | Black |    | Black |    | Red | Black |
| Value     | 55  | 60    | 65 | 70    | 75 | 80  | 85    |

Cards



## CRYPTS

Crypts is an old favorite of ours and it occurs here again with a parallel set of crypts for you to solve. The conditions are as for the other sessions. You may divide the work up any way you wish and you are free to discuss and talk freely as you work. The codes all have their time limits so work as quickly as you can. Once again the solution is on the back of each card and the directions are as before. You can use these solutions, if and when you are ready to give up, for crypts 3 and 6, but you should not use them for 1 and 5. Remember, your success in breaking these crypts is important in winning the prize.

Here is the first one. Let's go!

The time limit is 3 minutes for each crypt. Take note of the time required for solution or the number of words obtained in the time of 3 minutes.

Record as before.

Rating scales!

Record exact circumstances in re use of keys; who proposes; how group reacts; when proposal occurs, and note also, acceptance of time limit, or tendency to work beyond it.

Crypts to use:

II<sub>1</sub> Can you solve this.

II<sub>2</sub> This number code is easy.

II<sub>3</sub> And after all what is a lie? 'Tis but the truth in masquerade.

II<sub>5</sub> Doing this we are contributing to science.

II<sub>1</sub> CYSTAOOHNU LICYVSAOET

II<sub>2</sub> 100 - 40 - 45 - 95 - 70 - 105 - 65  
- 10 - 25 - 90 - 15 - 75 - 20 - 25  
- 45 - 95 - 25 - 5 - 45 - 125.

II<sub>3</sub> ADEK REUG NMA5 IHTU  
HETR TTUB ETIS ILAS  
HATI WLLA FTER ADNA.

II<sub>4</sub> 35. 23. 32. 52 - 52. 51. 24. 44. 35.  
32. 51. 42 - 12. 43. 32. 42. 14. 52 -  
35. 23. 22 - 12. 32. 14 - 25. 43. 32.  
55. 22 - 21. 24. 51. 52. 22. 43.

II<sub>5</sub> HWODSLIOSAKTALEMHSER  
OGOHLNIBSEBLTATIIYAX

II<sub>6</sub> USECS CSIPI WCIMR  
PEENP ILSEG LREUD

# III<sub>1</sub> SUOYHO ULONKD WTHINY BSOWYZ

|                  |           |          |          |           |    |            |    |     |
|------------------|-----------|----------|----------|-----------|----|------------|----|-----|
| III <sub>2</sub> | 7         | 16       | 9        | 18        | 8  | 18         | 26 | 8   |
|                  | 19        | 18       | 22       | 8         | 7  | 24         | 13 | 116 |
|                  | 22        | 13       | 11       | 26        | 26 | 26         | 26 |     |
|                  | <u>48</u> | 8        | 12       | <u>52</u> | 7  | <u>15</u>  | 15 |     |
|                  |           | 22       | 9        |           | 18 | <u>154</u> | 2  |     |
|                  |           | <u>2</u> | <u>7</u> |           | 8  |            | 8  |     |
|                  |           | 79       | 69       |           | 7  |            | 18 |     |

III<sub>3</sub> SSSCBOTOHEAEEIMOSNRR  
ERSYITINOGNS - CATTELL.

III<sub>4</sub> 43.33.32.41 √ 12.22.15.14  
-32.41 - 22.42.26 - 41.25.  
14.12.32.11.36 - 32.23.45.  
14.23.43.32.22.23.

III<sub>5</sub> ZRETSM ARGNIO EFRORA UONOWY.

III<sub>6</sub> EFERRESNUHTKMNORTASA.

III<sub>7</sub> WCOULV  
EUTALE  
GATESK  
RESTSI  
ORHASN  
UETDCE

## TARGET THROW

Now we come to the target situation and the conditions are just the same as before. You will recall that you are allowed ten throws, and that anytime the ball touches the target, that counts as a throw. No practice shots allowed. When you hit the line, your score is "outside", unless more than half of the ball touches "inside" of the line. Again, the score that you report will be used in determining your rank in competition for the prize.

You should be able to complete all of this, including rating scales, in five minutes.

## DYNAMOMETER PULL

Next is the dynamometer pull. It will be exactly the same today as at the last meeting. We will pull four times, fifteen seconds each time. Your score is the lowest point during the fifteen seconds. The first time will be without shock, and the last three times will be with shock.

After each pull report the score, and ask for an estimate of what will be done next time.

Record as before.

## INTERESTS I

Materials: Revised list of interests (ten copies). Orange ballot.

Says:

Here again is the list of activities which we gave you at your first meeting. Now that you know each other better and have had more time to consider it, we want to know if you are still interested in doing the same things. You recall that sometime later you will be invited as a group, to spend one evening of approximately three hours pursuing one of these activities. All of the groups will have to do the same thing. You may spend the next six minutes discussing these possibilities. Again, your score, and your chance for the prize, depend on the liveliness of your discussion, and on the number of ideas you talk about. At the end of six minutes I will ask you, as a group, to vote on the different possibilities. You are not, however to decide during the 6' discussion how you will vote. Are there any questions?

.....

At six minutes, E. fills out the orange ballot step by step, calling for a group decision at each point (but not himself calling for any votes). As soon as the rank order is determined he announces this, slowly and clearly, then

Says:

Now, we need to know how strong your preferences are. You have one hundred votes which you may divide in any way you wish. Remember, the alternative getting the most votes from all groups will be the one chosen. How shall I record your votes?"

O. should note attempts to register diversity of group desires, or to "load" the vote.

## CONSTRUCTION

The next task also is not new to you. It is construction again. The building materials are the same but the model takes on a rather different shape. This time you are to build this (C) kind of a thing. Again work as quickly as possible. Your score will be in terms of the time taken to do the job unless of course you are so slow that we have to stop you.

Before you begin we would like you once again to estimate how long you will take. Our results show that the average time for this model at the third session is 5 minutes. One group in 20 takes 1-1/2 minutes or less while one in 20 takes 9 minutes or more. How long will you take? O.K. try it!

Record as before and time with stopwatch.

O.K., your time was . . . . "Pull it to pieces." Experimenter assist in this.

"Now, if I ask you to repeat the construction, how long will it take you this time?"

Get this estimate and record it, but instead of asking that the figure be built, say "Rating scales". If the group persists and builds anyway, allow them to continue, if there is time to complete the session.

## DISCUSSION

As a final activity for this session we want you to discuss the whole session's activities to try to decide what were the group's strengths and its weaknesses, where it did well and where it seemed to fail. What suggestions can you make for a better performance if you were to meet again? You have six minutes for this, and your score will be the number of ideas you discuss.

## APPENDIX 1

### C. INSTRUCTIONS FOR OBSERVERS

- I For Assisting Experimenter and making Ratings.
- II For Classifying Interaction Behavior



## OBSERVER RATING INSTRUCTIONS

The function of the observer in this experiment is as follows: (1) To record clearly and completely, in as uniform manner and position as possible, all group products; (2) to record and classify the verbal behavior in the course of each situation and to complete the 13 ratings as soon as possible (and independently of E.) after each situation; (3) to describe as briefly as possible, any activity which he feels has not been adequately handled in the stereotyped treatment; (4) to assist the E. in preparing materials so as to keep the group functioning rapidly; (5) whenever possible, to keep his own time and record his own results. In some cases, his record will be the only one available

At the beginning of the first meeting of each group, O. will be introduced by name. From this time on, however, he should answer no questions (even direct ones) or in anyway communicate with or appear to respond (e.g., by laughter, disgust, etc.) to the group. (E. likewise must not communicate with them except to the extent necessary to insure their understanding their various problems.)

Note: It is important to not refer to this as a leadership study, as the awareness that this is being studied is believed to significantly change the situation.

### Session I.

This session begins with an "activator" statement by E. for the purpose of defining the group purpose and giving general instructions on procedure, etc. Following this the S's will be given attitude and interest forms (one at a time) to fill out, as individuals. As soon as these are completed, the individual record forms will be handed out and explained. Then, as rapidly as possible, Situation I will be presented.

Situation I Construction. Record discussion. Note who participates and how they do so. Note who leads and when, as well as type and amount of leadership present. Record planning in one color, actual construction another, and put a key on the margin. Note especially attempts to "sell" a defective model to E. and to conceal inaccuracies from him, or to work after time has been stopped. Record results in terms of time (minutes and seconds) and number of faces completed (session I figure has 11 faces). Also record aspiration level with a note as to who reports it.

Situation II Group Judgment. Record discussion etc., as above. Record answer exactly as given to E. and elapsed time (in seconds). Note especially if discussion goes beyond deadline and record amount. Be sure that you do not in any way, either now or at the break, indicate the adequacy of the group answer.

Situation III Attitudes. Record discussion and make ratings. Tab each discussion in a different color and put a key on the margin. Record the group vote accurately, on a scale like this (drawn on your blank sheet), using the arrow to indicate where the group ave. is reported to be.

Communists should be . . .

false 3 5 1 1 certain

Record voting time for each item.

Situation IV Guessing game. Record discussion and planning on classification sheet. Turn to blank sheet and record in sequence, who speaks, and whenever possible, indicate what they say. Place an arrow ( ) opposite each point where E. invites group to give up.

Situation V Dynamometer Pull. Record discussion and planning. Note how group approaches problem and method of pulling. Record results announced by E, and aspiration levels accepted by E.

Situation VI Interests I. Record discussion. Time each stage in filling out ballot. Make ratings. Make tabs during discussion in Green, during voting in Red.

Situation VII Card Sorting. Record discussion. Note (on blank page) attempts to move table, separate base cards, or go to illegal side of table.

Record time for completion of task. After group has gone, count the cards and record number of piles correct, illegal use of colors, etc.

Situation VIII Interests II. Record discussion. Be sure to tabulate each criticism (do this in unlabeled row at center of classification sheet.) (See definition of criticism below).

Record time for filling out ballot. Make a note of how group selects leader and who is elected. Make the ratings this time in terms of the entire session, and make any specific comments that may be useful in describing the group or defining further dimensions of syntality.

## Session II

This session will open with a review of the group purpose and of the rating scale procedure followed by a re-vote for leader. Note the results of this vote (method of voting, number of ballots, and who receives how many votes).

Situation I Jury Judgment. Record discussion on classification sheet. Record decision (give vote), time of reaching it, and note who reports it. Repeat for each subpart. Record case 1 in green 2 in red. Note the willingness of group to work in time limit.

Situation II Construction. See Session I Situation I. Record procedure and planning remarks in one color and remarks made in the course of "work" in another.

Describe and record leadership vote (time it). If there is discussion, record it in a 3rd color on construction classification sheet.

Situation III Group Judgment. See Session I, Situation II. Record procedure and planning remarks in green. Problem content remarks in red.

Situation IV Target throw. O. will audit this--the headphone in the next room. He will note indications of stepping over the line and other forms of "cheating". Record in blank sheet.

Situation V. Dynamometer pull. Record as much as possible. Be sure to get readings and estimates, as reported to the group by E. (E. will not have time to do this). Be sure to note who withdraws from participation. If time permits, give description summary of effect of shock (as indicated by remarks etc.).

Situation VI Attitudes. See Session I, Situation III.

Situation VII Crypts. Assist E. in explanation by holding materials, pointing out keys, etc. Record all discussion (during presentation and planning in doing work period in ). Record solutions given (whether correct or not), time, and who reports solution. Record exact circumstance in regard to the use of keys and tendency to accept time limits. Do this as follows:

e.g. Time \_\_\_\_\_ " \_\_\_\_\_ " (-words)

Situation VIII Interests II. See Session I, Situation VIII.

### Observer Rating Scales

General: All of these ratings (except for 2B) are ratings of the group, not of individual participants, or membership averages. Frequently rather long and somewhat heterogeneous situations must be summarized in one rating. When difficulty is encountered here, it may be helpful to recall that for the group member, there is probably an overall attitude with regard to the situation. This "overall" aspect is what the rating is to be based on.

For the purpose of this experiment a "leader" is defined as one who influences the group more than he is influenced by it. This influence may be brief, or continuous throughout a situation. It involves something more, however, than the mere receipt of attention while speaking. Influence involves an actual change in behavior.

(It has been noted that O's have a tendency to make ratings in the middle range (on a nine point scale, between 4 and 6). This should be avoided if adequate variance and reliability is to be obtained.

1. Group Organization: The structure of the group, the amount of differentiation of individual roles. At the left pole of this continuum, individual members proceed as individuals. The activity of one member with respect to the goal, cannot be differentiated from that of any other. At the opposite pole members have a rigidly prescribed role or task function which they carry out more or less adequately. In doing so, more attention will be given to seeing that the prescribed function is fulfilled than that what is done is adapted to the situation and coordinated with what other members are doing. (Frequently in such groups, members will persist in a role which is maladapted to the situation, while other tasks, necessary to group success are ignored). The optimum organization level appears to occur where task roles are differentiated sufficiently to make for individual efficiency, but not so much as to interfere with necessary modification and adaption to changing situations.

2. Nature of leadership: When no leadership can be detected, 2A-a should be checked. In this case, 2B will be left blank. Where one leader can be detected (for any given time) 2A-b will be checked. In case this single leader does not change in the situation, 2A-b-1 will be checked, or if a different person assumes leadership from time to time 2A-b-2 should be checked. Where the group seems to have a plurality of leadership, 2A-c (with 2A-c-1 or 2, whichever is appropriate) should be checked. Where the situation starts with a single leader, but develops so that two or more persons are leading simultaneously, 2A-d is checked and 2A-e is, of course, meant to be used for the reverse of this situation.

2B. The printed instructions are complete here. In the case of long situations, be sure to check not only the last leaders. It will sometimes prove helpful to turn to this during the situation and circle leaders as they are observed.

3. Leadership technique: (1) Leadership is completely authoritarian--leader dictated what group would do and how it would do it; (3) Authoritarian. The leader took control in following his own suggestions and gave little attention to suggestions of others; (5) Leader offers his suggestions for group approval; (7) Democratic. The group decided how it would proceed and leader accepts the decision with slight modification; (9) Completely democratic. Leader allows free expression by the members and attempts to execute the majority decision.

4. Degree of leadership: (Remember that this is a rating of a group variable.) (1) No leader at all--the group proceeds completely without organizational influence; (3) A little leadership for part of problem--occasionally something is done which tends to influence and direct behavior for a while; (5) Some leadership for parts of the problem--rather definite indications of leadership at times, but not continuously; (7) Definite leadership nearly all the time--as in (5), but continuously, rather than sporadic; (9) Very distinct and persisting leadership--here there is a marked amount of leadership throughout the situation.

5. Orderliness of procedure: The extent to which the group is methodical and systematic in its behavior. Orderliness does not imply that all behavior or attention is directed toward a common goal, but that what is directed toward a goal is efficiently directed, and that there is little interference between behavior directed toward different goals. For example, in discussion situations where it is necessary that all members perceive all the verbal behavior directed toward the goal, the presence of aside conversations, or of several simultaneous speakers etc., would make for disorderliness. However, in the construction situation, this would not be the case. The essential thing is the systematic way in which behavior is directed toward the goal. In discussions the goal is clarification of meaning; in construction it is a completed physical model. It is not necessary, however, for a group to orient its behavior toward the goal set by E., in order to be "orderly".

(1) Completely disorderly. No orderly seating, speaking, or acting.  
(3) Little order in seating, speaking, working, etc; (7) Considerable order in seating, speaking, and working, etc; (9) Completely orderly, speaking in turns, etc.

6. Freedom of group atmosphere: (1) Very restrictive: Little discussion; dominated by one or two members; (3) Restrictive: one or two take control and leave others little opportunity; (7) Permissive: most members talked and acted freely; (9) Very permissive. Free discussion; no cliques.

7. Degree of we-feeling: (synonyms; togetherness, cohesiveness, viscosity). That which sets a group apart from what would otherwise be just a collection of individuals. Where there is much we-feeling group members show mutual acceptance of each other, a tendency to cooperate, to work as a unit in the face of opposition, and an absence of conflicts among members. The different points on the rating scale are defined as follows: (1) No we-feeling. Very individualistic feeling. "I" and "my" used much more frequently than we and our. (3) Slight we-feeling; still a predominance of individualism; (7) Fair amount of we-feeling. Predominates over I-feeling; Members tend to think of themselves as belonging together; (9) High degree of we-feeling and group unity.

8. Degree of frustration: (1) None. Group proceeds smoothly to its goal. (3) Some difficulty encountered but solution readily found; (7) Considerable difficulty encountered; no ready solution; (9) Complete frustration--group sees no way of attaining goal.

NOTE: This is a rating of Frustration as felt, by the group. It is entirely possible that a group may fail completely, yet feeling no frustration, either because it believes it had succeeded, or because it is not interested in the problem.

9. Degree of interdependence: The members of groups which rate far left (no interdependence) go about their own way, pursuing the group problem as individuals, and show little awareness, or understanding, of what other members are doing. For example, in the construction situation, the members of such a group will work individually and will not be aware of what other members are doing. They will not attempt to integrate their work with that of other members. In discussion situations, ideas will not be related or in sequence, and there will be little evidence of interaction, or that one contribution is modified, or even reflects cognizance of previous ones. On the other hand, a group which ranks high in this variable will show interaction and progressive modification of contributions in discussion situations. There will be a commonness of "Focus" in such a group. On the construction problem, individuals may work independently, but they will be aware of what others are doing and will arrange their work so as to integrate it without waiting until the problem forces integration upon them.

NOTE 1. That this variable is not "orderliness of procedure". Early observation seems to indicate that it is completely unrelated to "orderliness".

NOTE 2. The phrase "Activity of each member is incomplete in itself" should not be taken to mean the activity of each member who is physically present. It refers only to the people that are making contributions and effecting a group product.

10. Motivation directed toward the group problem: The strength of interest or the expenditure of energy on the problem given the group by E, (1) Just following instructions; (3) Slight interest; (7) High interest (9) Real ego involvement--failure would hurt pride.

11. Tension-energy level: (1) merely physically present--no interest expressed either in the task at hand, or in any other activity; (3) slight involvement--some motivation toward a goal; (7) Fairly high energy level-- (9) Real ego-involvement and striving to attain a goal.

NOTE: whereas 10 is concerned solely with motivation toward the attainment of the group problem, as set by the Experimenter; 11 is concerned with the total motivation, whatever may be the goal. It is to be expected that the rating on 11 will be ordinarily directly below, or to the right of 10. By definition, it cannot be to the left.

12. Direction of motivation:

- a. 1 - all motivation and attention given to interpersonal conflict.  
5 - no interpersonal conflict evident.
- b. 1 - no attention given to situational goal, as set by E.  
5 - all activity directed toward this goal.

13. Content-procedure ratio (later called extent of explicit concern with procedure). The extent to which the group is aware of, and concerns itself with the machinery of organization and of performance. A group which rates on the extreme left on this dimension will pay little attention to "how" to do a task. There will be little preparatory discussion, and only rare assignment of specific tasks. The attack on the problem will often begin without any consideration of how to do it. At the other extreme, often so much time is spent in working out "how" to do the problem and so much attention will be given to developing a formally correct attack that the goal will be lost in a mass of details, and little time and energy may be left for the actual performance. (1) no procedural discussion or planning--members set to work without mentioning organizational or procedural problems; (3) Procedure mentioned, occasional suggestion made--group is aware of the problem of how to go about attaining goal, but scarcely stops to consider it; (5) group gives some attention to plans; (7) Completely detailed plans evolved--members roles are defined and group anticipates what it will encounter and determines in advance what to do; (9) Planning so extensive and rigid as to interfere with adaptability when unanticipated events arise or when something goes wrong.

THE O R SCALES FILLED OUT AFTER EACH SITUATION

1. Group Organization.

|              |           |          |             |            |  |
|--------------|-----------|----------|-------------|------------|--|
|              |           |          |             |            |  |
| Absolutely   | Loosely   | Some     | Moderately  | Rigidly    |  |
| no structure | organized | organiz. | high degree | structured |  |

2A. Nature of l'ship

- a. no L observable
- b. one L at any one time
  - 1. persistent through situation
  - 2. changing from time to time
- c. more than one l at one time
  - 1.
  - 2.
- d. single L at first giving away, to multiple
- e. multiple L at first giving away to single

2B. Who were the L's in this

situation? Circle all the L's and then place an X on any one that must be ranked above the rest.

W R O Y G

B V P D K

3. Leadership technique.

|   |                                      |                               |   |                       |
|---|--------------------------------------|-------------------------------|---|-----------------------|
| Comptly<br>Authian, L<br>Dictated<br>what to do<br>and how. | Authian, L.<br>followed own<br>sugg. | Offered sugg.<br>for approval | Democratic.<br>Gp decided.<br>L accepted. | Comptly<br>Democratic |
|---|--------------------------------------|-------------------------------|---|-----------------------|

4. Degree of leadership.

|                     |                                    |                                    |   |                                      |
|---------------------|------------------------------------|------------------------------------|---|--------------------------------------|
| No leader<br>at all | A little<br>Lship for<br>part time | Some Lship for<br>parts of problem | Definite<br>Lship<br>nearly<br>all time | Very distinct<br>persisting<br>Lship |
|---------------------|------------------------------------|------------------------------------|---|--------------------------------------|

5. Group orderliness of procedure (in seating, speaking, and working)

|                          |                 |                       |                       |
|--------------------------|-----------------|-----------------------|-----------------------|
| Completely<br>disorderly | Little<br>order | Considerable<br>order | Completely<br>orderly |
|--------------------------|-----------------|-----------------------|-----------------------|

6. Freedom of group atmosphere.

|   |   |  |  |
|---|---|--|--|
| Very<br>restrictive.<br>Little dis-<br>cussion.<br>Dominated by<br>1 or 2 mbrs. | Restrictive.<br>One or two<br>took control<br>left others<br>little<br>opportunity. | Permissive.<br>Most members<br>talked and<br>acted freely. | Very per-<br>missive.<br>Free dis-<br>cussion no<br>cliques. |
|---|---|--|--|

7. Degree of we-feeling. (w-f)

|  |  |   |  |
|--|--|---|--|
| No w-f<br>Very individual-<br>istic feeling.<br>I and my used<br>much more fre-<br>quently than we<br>and our. | Slight w-f<br>Still a pre-<br>dominance of<br>individualism. | Fair amount<br>of w-f. Pre-<br>dominates<br>over I-feeling. | High degree<br>of w-f and<br>group<br>unity. |
|--|--|---|--|

8. Degree of frustration.

|  |  |  |   |
|--|--|--|---|
| No frus-<br>tration.<br>Group<br>proceeds<br>smoothly<br>to its<br>goal. | Some dif-<br>ficulty<br>encountered<br>but solutions<br>readily found. | Considerable<br>difficulty<br>encountered<br>no ready<br>solution. | Complete<br>frustration.<br>Group sees<br>no way of<br>attaining<br>goal. |
|--|--|--|---|

9. Degree of interdependence.

|  |                         |  |  |
|--|-------------------------|--|--|
| No interdependence. Completely parallel individual behavior. | Slight interdependence. | Fairly interdependent. Absence of nearly any M Would change activity of group. | Very high interdependence. Activity of each M is incomplete by itself. |
|--|-------------------------|--|--|

10. Motivation.

|                              |                 |               |  |
|------------------------------|-----------------|---------------|--|
| Just following instructions. | Slight interest | High Interest | Real ego-involvement failure would hurt pride. |
|------------------------------|-----------------|---------------|--|

11. Tension-energy level.

|                            |                     |                           |                       |
|----------------------------|---------------------|---------------------------|-----------------------|
| Merely physically present. | Slight involvement. | Fairly high energy level. | Real ego involvement. |
|----------------------------|---------------------|---------------------------|-----------------------|

12. Direction of motivation.

- a. interpersonal conflict 1 2 3 4 5 smooth interaction between mbrs.
- b. activity not directed toward situation goal 1 2 3 4 5 all activity directed toward situation goal.

13. Content-procedure ratio.

|                             |                                      |                                   |                            |
|-----------------------------|--------------------------------------|-----------------------------------|----------------------------|
| No discussion of procedure. | Procedure mentioned suggestion made. | Complete, detailed plans evolved. | Excessive, rigid planning. |
|-----------------------------|--------------------------------------|-----------------------------------|----------------------------|



## INTERACTION ANALYSIS OF GROUP SYNERGY

The following interaction processes are to be recorded for each individual in the group in terms of frequency, for the given time sampling scheme among the group situations. It is intended for analysis of the mechanisms in maintenance and effective synergy, for relation to individual personality measures and for relation to the dimensions of syntality in individual groups.

Several tutorial sessions must be held among observers, alternating with observation sessions, to train in exact meaning of the 20 variables and the participation count. The attached list of examples of behavior coming under each heading should also be studied and practice given in being alert to the relationships among variables set out below each variable. No variable, incidentally, is the exact opposite of another, else they would be scored on the same bipolar continuum.

It will be understood (a) that these variables do not correspond to traits of individuals but only to behavior of an interactional kind, with respect to a group, and (b) that they refer to individuals not to group behavior, that they do not deal with relations e.g. comparison of earlier with later behavior, as in an estimate of fickleness, but with immediately observable behavior. However, they do involve a fair amount of interpretation of pattern; otherwise the number of observed behavior categories would far exceed 20.

In general an item of behavior will be entered by a check on the record sheet under the individual's symbol by one category only. But about once in five or ten occasions it will have dual or treble entry. The principal overlaps are among the categories marked above as difficult to distinguish (because they sometimes involve both purposes, and notably between giving information (6) and several other categories. It is a hold-all for a somewhat large range of variety of non group-directed behavior.

The categories are not in convenient order of general frequency of use, but are distinguished to the eye, for rapid location, by a pattern of varying width and thickness of lines.

Participation Count. Number of verbal contributions. (Except calling and answering in voting sessions.) A verbal contribution may range from one word to several sentences.

1. Encourages, cherishes. Encourages other individuals in the group, as individuals. Is altruistic and kindly, gives security, status, reward, protection, and welcome to participate to other members. (Contrast 10, hostility and distinguish 2 and 3; the latter is a more passive response, without congratulations.)
2. Relaxes, cheers. Breaks tension in group by jokes, laughter and attention to recreation; is tolerant; shows cheerful demeanor. (Distinguish from 17, as an attention to the mood of people rather than to purposes of group.)
3. Agrees, approves. Indicates acceptance of ideas, emotions, etc. Is understanding; goes along; agrees; is inclined to "Yes"; reacts to primitive passive sympathy, taking on emotions presented to him. (Contrast 10.)

4. Leads by suggestion. Takes leadership responsibility by attempting to control in a persuasive fashion. Suggests, makes compromises out of group conflicts, coordinates. Attempts to create by emotional suggestion to others the mood and viewpoint he possesses. (Distinguish the other form of leadership in 12 and note the reciprocal in 9.)
5. States wishes. States or shows personal feelings, desires, attitude, opinion, wish. (Principally on end goals but also on way something should be done.) Expressive emotionality is an extreme of this. (Note reciprocal in 8; distinguish 6 and 13.)
6. Gives information, techniques. States facts, gives information, explanation, contribution to technique rather than end goals. (Distinguish this impersonal supplying of facts from 4, 12, and 13; note reciprocal in 7.)
7. Asks information. Asks for information, fact, non-directive explanation of an impersonal kind. (Reciprocal of 6; distinguish 8 and 9.)
8. Asks others' wishes. Asks another person for his wishes, attitude, opinion, desire, feeling. (Reciprocal of 5. Note that 7, 8, and 9 may "confer status" as in 1, but are rarely to be entered there unless deliberate.)
9. Asks guidance or help. Asks another person for advice, direction, coordination or orders as to what he shall do. (Reciprocal of 4 and 12; distinguish 7 which is non-directive.)
10. Criticizes, disapproves. Criticizes an idea or the person giving it. Disagrees, declines to cooperate in the disapproved scheme suggested. Shows hostility to individuals and perhaps jealousy. (Contrast 3, distinguish from 18 and 19.)
11. Shows anti-social egoism. Expresses self without relation to group needs or in complete disregard of welfare of group, e.g. limelighting, phantasying, domineering, exploiting and being predatory, indulging in sociable play interrupting group purposes, joking inopportunistly, egoistically complaining, being delinquent against group rules. (Distinguish 16, 19, and 20.)
12. Leads by command. Takes leadership responsibility by attempting to give orders, to put ideas across regardless of those held by others, dominates with a plan, deals energetically with opposition. (Distinguish from leadership in 4.)
13. Clarifies common objectives. Defines goal or problem, clarifies what other people are getting at, tries to set acceptable standards of performance. (More impersonal than 4 or 12; more group directed than 6.)
14. Receives acceptance. His ideas evoke acceptance and approval. (This is less an "immediate" observation than the others, for it covers observations not only on immediate verbal response but also on what group does in following minute or two.)
15. Receives rejection. His ideas tend to be rejected, ignored or submerged. (Coordinate with 14.)

16. Rejects group. Rejects and destructively criticizes group, pointedly withdraws from attempts to solve group problems; revolts. (This active, non-participation must be distinguished, by whatever signs are available, from other kinds namely 11 which has no regard for group and the passive non-participation of 20 (in reverse) or the participation count, in which interest and goodwill may still be discerned. (Contrast 17.)

17. Cherishes group concept. Defends and enhances the behavior of the group as a group to members, e.g. against individual members' complaints. Is loyal to the group and intent on preserving its esteem among members. (Distinguish 1; contrast 11 and especially 16.)

18. Constructively criticizes and exhorts. Criticizes the group performance to improve it. Urges better performance, perhaps by shaming people. (Distinguish from 10 and 16 and from 17 by the emphasis on performance and the exhortation to reach standards.)

19. Attacks group environment. Complains to others about difficulties group has to face. Sympathizes with or defends group performance on ground that demands of environment (including experimenter) are excessive. Turns hostility on out-groups or environment (including experimenter, scape-goats or the weather) instead of on fellow members or self. (Distinguish 10, 11, and 16.)

20. Neglects group. This is to distinguish non-participation associated with boredom, fatigue, and loss of alertness from a simple low count in participation, where a quiet individual may still be alert to and enjoying group events. Shows lack of alertness, misses his cues, goes to sleep on the job. (Distinguish 11, which is positive anti-social expression and 16 which is attack on group as such.)

Situation

Group  
Session \_\_\_\_\_ Date \_\_\_\_\_  
Observer \_\_\_\_\_

Observer Interaction Analysis  
Record

D B G R K W O Y P V

Participation Count

1. Encourages, Congratulate
2. Relaxes Tensions
3. Agrees, Approves
4. Leads by Suggestion
5. States Wishes
6. Gives Information, Techniques
7. Asks Information
8. Asks Others' Wishes
9. Asks Guidance
10. Critic, Disapproves
11. Shows Egoism
12. Leads by Command
13. Clarifies Common Objectives
14. Receives Acceptance
15. Receives Rejection
16. Rejects Group
17. Cherishes Group Concept
18. Constructively Criticizes and Exhorts
19. Attacks Gp. Environ.
20. Neglects Gp.
- 21.
- 22.
- 23.

## APPENDIX 1

### D. Description of the Sociometric Data Forms.

## SOCIOMETRIC RESPONSE FORMS

These forms, handed out to subjects as one page in a booklet to be filled in after each situation, are too bulky to be included here. In all they consisted of about thirty pages on each of which were seven to ten items from the Master Table (Section 100 et. sig.) --the SR variables. These, of course, recurred for several different situations. Under each question, as listed in the Master Index was a graphic rating scale of 8 points, labelled at four intervals verbally as illustrated in the accompanying copy of one sheet from the booklet.

1 X 11111111

1 X 11111111  
1 X 11111111

Situation 1, - Jury Judgment.

1A. Indicate (by circling their numbers and crossing your own) which two members of this group you would most prefer to have serve with you on a jury.

1      2      3      4      5      6      7      8      9      10

1B. Now fill out independently this set of questions relating to the discussion you have just had and to the decisions reached.

1. To what extent did you feel the participants acted as a unified group rather than as a disjointed collection of individuals?

Disjointed  Completely integrated.

2. How well do you think this group would work together if it were a real jury?

Very much poorer                      Not any better                      Very much better

3. It often happens that a group would make better progress if certain people were not present. Which members of this group do you place in this category? Encircle these and cross your own number.

1      2      3      4      5      6      7      8      9      10

4. How free did you feel to bring up objections and suggestions in this jury group?

|           |            |                     |           |
|-----------|------------|---------------------|-----------|
| Very free | Quite free | Tended to hold back | Held back |
|-----------|------------|---------------------|-----------|

5. How much enjoyment did you get out of participating in this particular group activity?

|                     |                    |                            |
|---------------------|--------------------|----------------------------|
| Did not<br>enjoy it | Enjoyed it<br>some | Enjoyed it<br>a great deal |
|---------------------|--------------------|----------------------------|

6. To what extent did you feel you were really accepted as a member of this jury group?

Rejected Completely  
accepted

1C. Indicate which of the persons in this group you like best because of the kind of persons they seem to be.

**Most** . . . . .

**Next least . . . . .**

**Next most** . . . . .

Least . . . . .

## APPENDIX 2

### BASIC STATISTICAL DATA



## BASIC STATISTICAL DATA.

### A. CORRELATION MATRICES

- I. Session I
- II. Session II
- III. Session III

### B. UNROTATED FACTOR MATRICES

- I. Session I
- II. Session II
- III. Session III

### C. ROTATED FACTOR MATRICES

- I. Session I
- II. Session II
- III. Session III

### D. THE INTERFACTOR ANGLES AND TRANSFORMATION MATRICES

- I. Session I
- II. Session II
- III. Session III

APPENDIX 2 A L

Correlation Matrix  
for  
Session I.

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tation Institute  
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## APPENDIX 2 A I.

### Correlation Matrix for Session II.

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tation Institute  
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APPENDIX 2 A I.

Correlation Matrix  
for  
Session III.

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## APPENDIX 2

### B. Unrotated Factor Matrices.

|     |           |   |
|-----|-----------|---|
| I   | Session 1 | 1 |
| II  | "         | 2 |
| III | "         | 3 |

APPENDIX

APPENDIX 2 B I

Unrotated Factor Matrix  
for  
First session of Groups

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# UNROTATED FACTOR MATRIX Session 2

|    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | h <sup>2</sup> |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------|
| 1  | -.31 | .09  | -.38 | .09  | .11  | .21  | -.06 | -.16 | .01  | -.22 | -.13 | -.04 | .02  | -.05 | -.06 | .06  | -.11 | .43            |
| 2  | -.59 | .33  | -.34 | .04  | .09  | .07  | -.03 | .12  | .07  | -.03 | -.30 | .19  | .09  | .10  | .25  | -.09 | -.06 | .83            |
| 3  | -.28 | .32  | -.23 | .03  | -.03 | .27  | -.02 | -.18 | .05  | .04  | -.21 | .46  | .39  | .21  | .38  | -.18 | -.04 | .98            |
| 4  | -.49 | .28  | -.12 | .08  | .15  | .16  | -.14 | -.38 | .10  | .24  | -.12 | .06  | .30  | -.27 | .15  | .03  | -.15 | .85            |
| 5  | -.39 | .15  | -.08 | -.34 | .18  | -.06 | -.03 | .10  | .20  | -.08 | -.02 | .16  | .48  | -.02 | -.16 | -.06 | -.01 | .68            |
| 6  | .00  | .20  | .22  | -.57 | -.18 | .01  | .39  | -.26 | .16  | .34  | -.17 | -.09 | -.20 | -.19 | .08  | -.24 | .01  | .98            |
| 7  | -.21 | .43  | .07  | -.47 | -.12 | .05  | .08  | -.29 | .20  | .20  | -.22 | .08  | .35  | -.17 | .04  | -.18 | -.26 | .95            |
| 8  | -.15 | -.26 | -.22 | .14  | .30  | -.07 | -.17 | .14  | -.10 | -.31 | -.23 | -.08 | -.25 | .07  | -.09 | .25  | .16  | .63            |
| 9  | .02  | -.20 | -.13 | -.31 | .07  | -.29 | .09  | .50  | .04  | -.11 | -.15 | -.01 | -.01 | -.19 | -.33 | .17  | .16  | .74            |
| 10 | -.11 | -.56 | -.11 | .12  | .55  | -.13 | -.02 | .34  | .08  | -.15 | -.29 | -.18 | -.11 | -.12 | .14  | .06  | .31  | 1.08           |
| 11 | -.43 | .17  | -.12 | -.54 | -.21 | .15  | -.02 | .07  | .20  | .34  | -.21 | -.01 | .20  | -.14 | .20  | -.17 | -.06 | .92            |
| 12 | .20  | -.36 | -.13 | .19  | .52  | -.00 | .11  | .24  | .07  | -.21 | -.05 | -.19 | -.40 | .02  | -.19 | -.48 | .18  | 1.11           |
| 13 | -.65 | .01  | -.33 | -.21 | -.02 | .17  | .04  | .24  | .08  | -.09 | -.20 | .01  | .03  | -.12 | -.25 | .13  | -.05 | .82            |
| 14 | -.25 | .02  | .06  | -.15 | .16  | -.34 | .00  | -.03 | .12  | .25  | .01  | .11  | .01  | -.13 | .14  | -.23 | .39  | .56            |
| 15 | .00  | .37  | .22  | -.37 | -.45 | -.08 | .13  | -.11 | .03  | .20  | -.03 | .07  | -.10 | -.07 | -.10 | .24  | -.17 | .58            |
| 16 | .10  | -.30 | -.24 | .02  | .55  | -.08 | .12  | .33  | .06  | -.12 | -.08 | -.27 | -.08 | .01  | .02  | -.25 | .15  | .78            |
| 17 | -.42 | .10  | -.14 | -.10 | -.03 | -.01 | -.10 | .06  | .06  | -.15 | .26  | .02  | -.22 | -.12 | .12  | -.06 | .11  | .42            |
| 18 | .22  | .16  | .01  | .19  | .04  | -.23 | -.11 | -.20 | -.03 | .04  | .09  | -.33 | .00  | -.08 | .02  | -.15 | .33  | .47            |
| 19 | .21  | -.17 | .13  | .05  | .05  | -.12 | .09  | .02  | .11  | -.10 | .24  | .24  | .12  | -.11 | -.36 | .10  | .27  | .49            |
| 20 | -.20 | .28  | -.36 | -.02 | .01  | -.12 | .14  | .12  | .05  | -.24 | .26  | .07  | .23  | .19  | .11  | .13  | .13  | .56            |
| 21 | -.39 | .20  | -.39 | -.31 | .11  | -.06 | .01  | .25  | .26  | .11  | .01  | -.03 | -.21 | -.02 | -.03 | .19  | -.02 | .68            |
| 22 | -.18 | .08  | -.28 | -.39 | -.17 | -.07 | -.01 | .19  | .24  | -.13 | -.11 | -.10 | -.16 | .18  | -.15 | -.04 | .00  | .52            |
| 23 | .08  | .02  | -.18 | -.22 | -.08 | -.06 | -.12 | .04  | .28  | -.03 | .04  | -.00 | .00  | -.11 | .25  | .65  | -.08 | .70            |
| 24 | -.48 | -.17 | .12  | .10  | -.03 | .00  | -.01 | .07  | -.12 | -.09 | -.41 | .08  | .12  | .01  | .11  | .29  | -.03 | .60            |
| 25 | -.73 | -.19 | .09  | -.27 | -.25 | .02  | .11  | .27  | .01  | .06  | -.02 | .14  | .12  | .13  | -.30 | .38  | .04  | 1.09           |
| 26 | -.21 | .02  | .14  | .17  | -.30 | .47  | .17  | .12  | -.15 | .11  | -.22 | -.02 | .05  | -.05 | -.10 | .32  | .23  | .70            |
| 27 | -.15 | -.03 | -.02 | .03  | .08  | .28  | .12  | .15  | .21  | .06  | .03  | -.14 | -.03 | .03  | -.03 | .04  | .62  | .60            |
| 28 | -.13 | .09  | -.06 | .05  | .01  | .10  | .28  | .05  | -.03 | .17  | .02  | -.13 | -.16 | -.45 | .22  | -.20 | .14  | .51            |
| 29 | -.46 | .15  | -.17 | -.34 | -.23 | -.08 | .10  | .36  | .10  | -.05 | .01  | .03  | .30  | .14  | -.25 | .23  | -.15 | .84            |
| 30 | -.50 | .16  | .03  | -.37 | -.07 | -.06 | .01  | -.00 | .08  | -.01 | .17  | .20  | .11  | .23  | -.11 | .06  | -.03 | .53            |
| 31 | .00  | .08  | -.06 | -.22 | -.00 | .17  | .12  | .09  | .03  | -.03 | -.00 | -.05 | .30  | -.06 | -.25 | .17  | -.04 | .30            |
| 32 | .16  | .01  | -.20 | .01  | -.06 | .14  | .24  | -.06 | .12  | .02  | -.06 | .09  | .01  | -.06 | .31  | -.34 | .17  | .42            |
| 33 | -.30 | .71  | -.02 | -.19 | -.03 | -.21 | -.05 | .15  | -.16 | .10  | .19  | .15  | -.08 | .00  | -.22 | .23  | .03  | .90            |
| 34 | -.22 | .09  | -.22 | .08  | -.17 | .06  | -.18 | .25  | .00  | .06  | -.04 | .40  | .06  | -.22 | -.22 | .11  | .39  | .67            |
| 35 | -.43 | .58  | -.11 | -.15 | -.12 | .08  | .18  | .21  | -.34 | -.18 | .02  | -.09 | -.28 | .14  | .04  | .03  | .05  | .91            |
| 36 | -.20 | .54  | .01  | .02  | -.10 | -.07 | .00  | -.10 | -.26 | .18  | .24  | .23  | -.04 | .08  | -.05 | .19  | .29  | .70            |
| 37 | .01  | .48  | -.09 | .34  | .04  | -.03 | -.01 | .03  | .20  | .13  | -.01 | .03  | -.11 | -.07 | -.07 | -.05 | .14  | .46            |
| 38 | -.43 | .70  | -.09 | -.01 | .14  | .08  | .04  | .23  | .04  | -.13 | .12  | .18  | -.02 | -.08 | -.02 | .11  | .02  | .85            |
| 39 | .14  | -.09 | -.25 | .13  | -.08 | .03  | .77  | -.10 | .07  | .25  | -.15 | .14  | -.03 | -.10 | -.10 | .13  | -.27 | .94            |
| 40 | -.29 | .62  | .09  | -.01 | .15  | .04  | -.12 | .13  | -.06 | -.07 | -.05 | .15  | .02  | .00  | -.06 | .07  | -.06 | .58            |
| 41 | -.29 | .74  | -.03 | .04  | .09  | -.01 | -.07 | .01  | .19  | -.32 | .03  | .03  | -.28 | -.10 | .22  | -.03 | -.03 | .83            |
| 42 | -.38 | .70  | -.12 | .14  | .08  | -.03 | .03  | .13  | .31  | -.32 | -.03 | -.08 | .27  | -.20 | .11  | .06  | -.13 | 1.04           |
| 43 | -.03 | .07  | .34  | .06  | .20  | .21  | -.33 | .05  | .11  | .25  | -.22 | .12  | .20  | .12  | .18  | .00  | .03  | .54            |
| 44 | -.27 | .59  | -.01 | .02  | -.21 | .09  | -.30 | .06  | .03  | -.20 | -.02 | .09  | -.06 | -.08 | .19  | -.20 | .09  | .71            |
| 45 | -.04 | .60  | -.03 | .10  | -.07 | -.05 | .14  | -.04 | .04  | .04  | .13  | .02  | -.07 | -.08 | -.10 | .08  | .22  | .50            |
| 46 | -.21 | -.04 | -.61 | -.03 | -.11 | -.05 | -.22 | -.03 | .23  | -.17 | .38  | .22  | .09  | -.11 | -.24 | -.11 | -.03 | .85            |
| 47 | .19  | .27  | -.03 | .57  | .03  | .04  | .10  | -.05 | .01  | -.19 | -.04 | -.15 | .04  | .13  | .09  | -.07 | .04  | .54            |
| 48 | -.13 | .22  | -.37 | .09  | .26  | .27  | -.14 | .01  | .21  | -.01 | .02  | -.17 | -.12 | .22  | .06  | -.18 | .04  | .54            |
| 49 | .21  | -.06 | -.18 | -.02 | -.03 | .01  | .14  | -.00 | -.55 | .09  | -.09 | .09  | .37  | .04  | -.25 | .31  | .03  | .73            |
| 50 | -.06 | -.23 | -.31 | -.27 | .15  | .07  | .02  | .66  | -.22 | .07  | -.11 | -.01 | .20  | -.17 | .05  | .11  | -.03 | .84            |
| 51 | .06  | .76  | -.14 | -.02 | .02  | .07  | -.03 | -.04 | .15  | .33  | -.28 | -.21 | .27  | .28  | .15  | -.24 | -.04 | 1.10           |
| 52 | -.35 | .28  | .05  | -.23 | -.60 | .06  | -.01 | .11  | -.03 | -.23 | -.06 | -.03 | .06  | -.01 | -.16 | -.42 | -.04 | .90            |

|     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | $h^2$ |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 53  | 14  | 13  | 01  | 20  | -07 | 19  | 01  | -27 | 09  | 16  | 29  | 10  | -14 | 19  | -04 | 67  | -25 | 88    |
| 54  | 11  | -25 | -06 | -02 | 56  | -10 | 03  | 05  | -04 | -25 | 15  | -09 | 11  | -03 | -09 | -06 | 04  | 53    |
| 55  | 05  | -20 | -03 | 32  | 19  | -22 | 03  | 08  | -10 | 07  | -02 | -07 | 13  | -36 | 17  | -11 | -12 | 45    |
| 56  | 10  | 07  | -05 | 03  | -00 | -14 | -06 | 03  | 08  | 04  | -05 | 37  | 03  | 17  | 28  | 20  | -01 | 34    |
| 57  | -53 | -00 | 12  | 20  | 11  | -23 | 10  | -15 | -20 | 23  | -06 | -06 | -21 | -02 | 20  | -01 | 18  | 65    |
| 58  | 35  | -48 | 05  | -09 | 75  | 01  | 04  | -07 | -04 | 12  | -16 | 42  | 21  | 12  | -38 | 36  | -13 | 1.50  |
| 59  | -16 | 24  | 03  | 70  | -11 | -00 | 26  | 10  | -17 | 05  | -03 | -02 | 35  | 03  | -21 | 04  | -18 | 90    |
| 60  | -09 | 03  | 10  | 27  | -22 | 10  | -07 | 01  | -02 | -03 | 65  | 11  | 32  | 07  | -24 | -02 | -04 | 76    |
| 61  | 19  | 14  | -05 | 70  | -31 | -02 | -07 | -07 | -9  | 10  | -07 | -02 | -16 | -01 | 04  | 01  | 00  | 72    |
| 62  | -06 | 28  | 02  | 74  | 09  | -01 | 14  | -18 | 01  | 09  | -03 | 25  | -12 | 06  | -19 | -12 | -22 | 88    |
| 63  | 07  | -03 | 01  | -07 | 23  | 01  | -07 | -25 | 15  | 08  | -00 | 36  | -45 | 03  | -02 | 08  | -13 | 52    |
| 64  | 11  | -05 | 14  | 33  | -08 | -06 | 22  | -10 | -11 | -39 | -08 | 17  | 30  | -08 | 02  | 11  | -31 | 62    |
| 65  | 05  | -13 | 23  | -13 | -13 | 10  | 02  | 25  | -03 | 11  | 59  | -03 | -07 | -13 | -04 | 05  | 01  | 57    |
| 66  | -02 | 08  | 04  | 25  | -22 | 22  | -05 | -05 | 01  | 22  | -00 | 46  | -27 | 01  | -13 | -09 | 07  | 54    |
| 67  | 06  | 16  | -04 | 60  | -17 | -10 | -03 | -09 | 24  | 03  | 07  | -13 | -26 | 07  | 17  | -06 | 21  | 67    |
| 68  | 62  | -09 | 10  | -17 | 20  | -11 | 25  | -13 | -02 | 25  | 03  | 08  | -20 | -05 | -44 | 07  | 19  | 91    |
| 69  | -24 | 25  | -03 | 12  | -30 | -05 | 11  | 24  | -17 | -11 | -10 | -05 | -23 | 21  | 13  | -11 | 15  | 50    |
| 70  | 69  | 36  | -14 | -12 | -18 | -04 | 00  | 04  | -09 | 11  | -18 | -09 | -14 | 15  | 18  | 04  | -15 | 83    |
| 71  | 84  | 30  | -01 | -20 | 12  | -05 | -20 | -21 | 06  | 17  | -04 | 21  | 06  | 04  | 03  | 06  | -25 | 1.09  |
| 72  | 35  | 26  | 04  | 08  | 05  | -02 | -04 | -19 | 00  | 18  | -20 | -21 | -10 | 01  | -28 | -30 | -02 | 53    |
| 73  | -67 | 65  | -07 | 21  | -04 | -02 | -08 | -01 | 10  | 30  | -28 | -32 | 22  | -14 | -02 | -13 | -17 | 1.32  |
| 74  | 34  | -29 | -12 | 10  | 17  | -07 | -00 | 29  | 04  | -04 | 15  | 19  | -01 | -12 | -04 | -26 | -04 | 49    |
| 75  | -23 | -09 | 03  | -04 | 21  | -22 | -04 | 59  | -10 | 56  | 08  | 30  | 05  | 15  | -18 | 13  | -31 | 1.09  |
| 76  | 24  | 15  | -12 | 11  | -12 | 22  | -34 | -25 | -09 | -55 | -03 | 19  | 10  | -09 | 09  | -19 | 06  | 76    |
| 77  | 44  | -05 | -11 | 14  | -20 | 35  | -01 | -40 | -05 | -40 | -18 | -11 | -07 | -22 | 26  | -16 | 27  | 98    |
| 78  | 39  | -33 | 31  | 22  | 06  | 20  | -05 | -23 | -18 | 04  | 22  | -15 | -23 | 13  | -19 | 27  | -20 | 83    |
| 79  | -20 | 34  | -19 | -16 | -14 | -24 | -02 | 14  | 06  | -02 | -05 | 20  | 19  | 12  | -03 | 13  | 04  | 43    |
| 80  | 21  | 22  | 66  | -09 | 13  | 11  | -20 | -05 | 21  | 09  | -02 | -06 | -10 | -04 | 05  | -15 | 02  | 70    |
| 81  | 04  | -27 | -44 | -26 | 04  | -19 | -24 | -07 | -00 | 05  | 05  | 04  | -21 | 21  | 28  | -18 | 15  | 66    |
| 82  | -06 | 06  | -22 | -24 | -13 | -62 | -11 | 10  | -06 | 10  | -04 | -03 | 14  | -08 | -08 | -15 | 13  | 62    |
| 83  | 31  | -09 | 15  | -23 | 01  | -03 | -01 | 47  | 23  | -15 | 07  | 09  | 15  | -03 | -44 | 44  | -12 | 92    |
| 84  | 07  | 07  | 64  | -27 | -03 | 22  | -07 | 09  | 14  | -06 | 03  | -18 | -08 | -07 | 01  | 04  | -06 | 60    |
| 85  | 21  | 21  | 70  | 05  | 12  | -10 | 06  | -11 | 05  | -08 | 16  | 16  | 13  | -07 | -31 | 16  | 04  | 83    |
| 86  | -25 | 30  | -09 | -03 | -06 | 03  | -14 | 20  | 18  | 01  | -11 | 17  | -08 | -11 | -04 | -10 | -00 | 33    |
| 87  | -09 | 21  | 52  | -17 | 03  | 12  | -18 | 02  | 10  | 09  | -12 | 04  | -15 | -14 | 10  | -06 | -09 | 50    |
| 88  | 00  | 02  | 67  | -11 | -02 | -20 | 03  | -20 | -06 | -16 | -08 | 18  | 16  | -05 | -09 | 10  | -06 | 66    |
| 89  | 24  | -10 | 82  | -13 | 17  | -16 | -12 | -06 | 23  | -03 | 06  | 15  | -03 | -05 | -03 | -30 | 06  | 1.01  |
| 90  | -42 | 28  | 43  | -01 | 04  | 13  | -07 | -11 | -12 | 12  | -02 | -22 | -16 | -04 | 02  | -35 | -16 | 73    |
| 91  | -05 | -01 | 24  | -05 | -07 | -23 | 30  | -46 | 00  | -02 | 13  | 09  | 10  | 01  | 41  | -27 | 07  | 70    |
| 92  | -09 | -06 | -46 | -17 | 07  | -29 | 06  | -18 | -29 | 08  | 09  | 10  | 06  | -21 | -30 | 17  | -15 | 67    |
| 93  | 21  | -04 | 21  | 07  | -01 | -00 | 11  | -05 | -06 | 09  | -14 | -01 | 15  | 68  | 22  | 15  | 27  | 77    |
| 94  | 15  | 11  | 25  | 15  | -07 | 06  | -18 | 03  | 49  | -11 | -18 | -05 | 04  | -14 | 08  | 11  | -15 | 51    |
| 95  | 21  | 06  | -10 | 02  | -01 | -21 | -22 | -11 | -20 | -03 | 04  | -08 | 07  | 45  | -13 | -14 | -10 | 47    |
| 96  | -28 | -01 | -07 | -07 | -06 | -10 | 31  | 08  | 07  | -06 | 21  | 04  | 13  | 03  | -03 | 06  | 11  | 27    |
| 97  | -01 | -01 | 26  | 05  | -14 | 35  | -50 | -09 | -05 | -07 | 25  | 11  | 09  | -03 | -24 | 03  | 01  | 62    |
| 98  | -05 | 08  | 16  | -08 | 22  | -10 | -83 | -09 | -05 | -07 | 15  | -09 | 05  | -05 | 14  | -03 | 11  | 87    |
| 99  | -03 | 02  | 07  | -02 | -04 | 30  | -08 | -03 | -10 | -29 | 17  | 15  | -07 | 28  | -22 | -04 | 02  | 38    |
| 100 | -19 | 23  | 03  | -03 | 01  | -01 | 10  | 26  | -25 | -08 | 17  | 23  | -05 | -07 | 53  | -29 | 10  | 70    |
| 101 | -14 | 15  | 25  | 15  | -27 | -16 | 02  | 16  | 76  | 11  | 03  | -12 | 16  | 24  | -26 | 30  | -19 | 1.13  |
| 102 | 09  | 09  | 43  | 05  | 09  | 78  | 11  | 25  | -04 | 15  | -16 | 20  | 05  | -17 | 04  | -35 | 17  | 1.17  |
| 103 | 10  | -25 | 25  | 08  | -16 | -06 | -13 | 02  | -22 | 09  | -12 | 16  | -18 | -22 | -03 | -29 | 13  | 47    |
| 104 | -37 | 40  | 03  | -01 | -25 | -06 | 17  | 16  | 14  | -03 | 06  | 17  | 08  | 05  | -16 | 06  | 22  | 56    |



# UNROTATED FACTOR MATRIX Session 3

|    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | $h^2$ |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 1  | -.09 | .51  | -.18 | -.16 | .04  | .14  | -.12 | -.15 | -.15 | -.16 | -.34 | .03  | -.38 | .02  | .02  | .69   |
| 2  | -.42 | .54  | -.08 | -.17 | -.42 | .14  | .01  | .06  | .01  | .01  | -.23 | .03  | .09  | -.08 | .03  | .77   |
| 3  | -.54 | .12  | .08  | -.21 | .60  | .07  | .04  | -.11 | .14  | -.03 | -.18 | -.18 | -.16 | .29  | .26  | 1.00  |
| 4  | -.50 | .36  | .02  | .22  | .08  | -.21 | .29  | -.15 | -.07 | -.20 | -.03 | .10  | -.42 | .16  | -.09 | .85   |
| 5  | -.68 | .00  | -.07 | .03  | .09  | .01  | .10  | -.40 | .08  | -.16 | -.06 | .18  | -.30 | .26  | .02  | .87   |
| 6  | -.46 | -.29 | .11  | .17  | .23  | .02  | .00  | .28  | -.07 | -.09 | .37  | .16  | -.23 | .03  | -.06 | .70   |
| 7  | -.66 | .02  | .08  | .02  | .52  | -.04 | .09  | .11  | -.14 | -.12 | .18  | .23  | -.31 | .05  | -.16 | .78   |
| 8  | .24  | .40  | -.21 | .21  | -.42 | .16  | .06  | .04  | .04  | .26  | .20  | -.13 | -.17 | .21  | .01  | .71   |
| 9  | -.28 | -.32 | -.26 | .36  | -.44 | .17  | .01  | -.09 | .16  | .13  | .19  | .08  | .15  | -.03 | .01  | .59   |
| 10 | .10  | -.14 | -.22 | .19  | -.65 | -.10 | .02  | -.21 | .00  | .22  | .01  | -.07 | -.08 | .04  | .02  | .65   |
| 11 | -.83 | -.09 | -.12 | -.20 | .13  | .04  | -.08 | -.01 | -.15 | -.03 | .10  | .01  | .08  | -.26 | -.24 | .74   |
| 12 | .51  | -.05 | -.26 | -.07 | -.56 | .05  | -.01 | -.21 | .14  | .04  | .01  | -.00 | .16  | -.05 | .14  | .76   |
| 13 | -.53 | .31  | -.19 | .08  | -.25 | .33  | .04  | -.23 | -.09 | .03  | -.01 | .09  | -.13 | -.01 | -.06 | .63   |
| 14 | -.23 | .02  | -.01 | .03  | -.09 | -.14 | .19  | .05  | -.04 | -.01 | .39  | .11  | -.05 | -.07 | -.24 | .35   |
| 15 | -.37 | -.10 | .29  | .06  | .49  | .16  | -.04 | .39  | -.03 | .04  | .20  | .08  | -.07 | -.11 | -.21 | .76   |
| 16 | .22  | -.05 | -.33 | .13  | -.60 | .05  | -.05 | -.46 | .05  | -.01 | .10  | -.01 | .16  | .00  | .06  | .80   |
| 17 | -.27 | .09  | -.16 | -.13 | -.08 | -.06 | .08  | .21  | -.12 | .16  | -.04 | -.13 | -.04 | .10  | .11  | .27   |
| 18 | .16  | -.20 | -.04 | .07  | -.16 | -.26 | -.02 | -.03 | .24  | -.03 | .12  | -.17 | .13  | .52  | .06  | .56   |
| 19 | .22  | -.21 | .09  | .07  | -.03 | .01  | .10  | -.54 | -.19 | -.17 | .00  | .14  | -.04 | -.31 | -.11 | .60   |
| 20 | -.32 | .26  | -.11 | .14  | .15  | .05  | -.12 | -.14 | -.33 | -.21 | -.31 | -.02 | -.08 | .26  | .05  | .58   |
| 21 | -.35 | .36  | -.29 | .04  | -.15 | .17  | -.10 | -.00 | -.09 | -.17 | .04  | -.16 | .07  | -.08 | -.13 | .49   |
| 22 | -.44 | .10  | -.32 | .00  | -.24 | .46  | .16  | .11  | .02  | -.18 | -.22 | -.01 | -.02 | .22  | .09  | .75   |
| 23 | -.11 | .07  | -.12 | .15  | -.04 | -.04 | -.01 | -.06 | -.16 | .12  | .03  | .01  | -.29 | .31  | .07  | .29   |
| 24 | -.19 | .03  | -.01 | -.04 | -.12 | .06  | .02  | .00  | .10  | .29  | -.03 | .12  | .17  | -.11 | .00  | .21   |
| 25 | -.64 | -.17 | -.05 | -.09 | -.07 | .18  | -.09 | .05  | -.13 | .25  | .01  | .02  | .15  | -.25 | -.12 | .68   |
| 26 | -.23 | -.04 | .33  | .11  | -.04 | -.17 | .02  | -.15 | .01  | .04  | .04  | -.00 | -.02 | -.23 | .05  | .29   |
| 27 | -.10 | .03  | .04  | .16  | -.13 | .27  | -.11 | -.20 | .15  | -.08 | -.05 | .17  | .02  | .15  | -.04 | .26   |
| 28 | -.05 | .04  | -.11 | .19  | -.04 | -.09 | .02  | -.00 | -.04 | -.08 | .16  | -.20 | -.01 | -.35 | .08  | .26   |
| 29 | -.53 | .26  | -.10 | .07  | -.06 | .35  | -.05 | -.05 | -.18 | -.07 | .03  | .08  | .17  | .03  | -.17 | .60   |
| 30 | -.49 | -.03 | .06  | -.14 | .08  | .22  | .15  | .12  | -.19 | -.12 | .01  | .15  | .13  | .11  | -.08 | .46   |
| 31 | -.19 | -.16 | -.07 | -.10 | .08  | .11  | .02  | -.23 | -.21 | -.09 | -.12 | .43  | .19  | -.49 | -.26 | .74   |
| 32 | .07  | .01  | -.13 | .12  | .18  | -.01 | -.09 | -.23 | -.08 | .11  | -.16 | .04  | .38  | -.15 | -.04 | .34   |
| 33 | -.13 | .35  | .31  | -.04 | .41  | .08  | .01  | -.29 | -.13 | .14  | -.16 | -.18 | .35  | -.64 | -.23 | 1.18  |
| 34 | -.17 | -.01 | -.56 | .08  | -.12 | .11  | -.21 | .01  | .09  | .06  | .46  | -.10 | .21  | -.03 | -.17 | .73   |
| 35 | .30  | .22  | -.52 | -.02 | -.08 | .08  | -.08 | -.11 | .11  | .29  | .03  | -.24 | .07  | .19  | .16  | .66   |
| 36 | -.01 | -.05 | .84  | .23  | -.01 | .14  | -.14 | .03  | -.00 | -.08 | .11  | -.02 | -.12 | .32  | .13  | .93   |
| 37 | .06  | -.01 | .84  | .18  | .10  | -.04 | -.04 | -.04 | .08  | .10  | .20  | .09  | -.09 | .12  | .05  | .85   |
| 38 | .42  | .14  | .50  | -.05 | -.12 | -.32 | .06  | .12  | .01  | -.19 | -.23 | -.03 | .06  | .33  | .13  | .80   |
| 39 | -.34 | .08  | .69  | .14  | .23  | .12  | .13  | .10  | -.11 | -.04 | .06  | .05  | -.23 | .11  | .08  | .72   |
| 40 | -.13 | .11  | .53  | -.01 | -.10 | .04  | .15  | .02  | .20  | .09  | .14  | -.33 | .13  | .02  | -.02 | .54   |
| 41 | -.10 | -.06 | .85  | .04  | .14  | .11  | .07  | -.06 | -.03 | -.06 | .18  | .18  | .00  | .17  | .04  | .86   |
| 42 | -.03 | .02  | .77  | .12  | .02  | -.01 | -.01 | .01  | .12  | -.05 | .25  | .09  | .00  | .07  | -.13 | .72   |
| 43 | -.00 | .46  | .04  | -.01 | .02  | .06  | -.01 | -.02 | .28  | -.16 | .21  | -.04 | .68  | -.09 | -.15 | .87   |
| 44 | -.21 | .30  | .14  | -.07 | .20  | .39  | -.13 | .09  | .22  | .04  | -.09 | -.20 | -.14 | .19  | .07  | .53   |
| 45 | -.18 | .01  | .21  | .18  | .21  | .28  | .07  | -.06 | -.06 | .22  | .13  | -.42 | .24  | -.22 | -.01 | .59   |
| 46 | -.02 | .07  | -.01 | .06  | .32  | .31  | .67  | .02  | -.12 | .24  | .22  | .13  | .19  | .07  | .33  | .94   |
| 47 | -.19 | .11  | -.32 | -.24 | .09  | .13  | .38  | .35  | -.15 | .01  | -.20 | -.20 | .14  | .06  | -.01 | .63   |
| 48 | -.10 | .40  | .20  | -.03 | .12  | .05  | .08  | .04  | -.03 | .04  | -.07 | -.14 | .09  | .18  | .18  | .34   |
| 49 | -.53 | .59  | .11  | .15  | .04  | -.11 | -.05 | .05  | -.01 | .10  | .19  | .03  | -.05 | -.00 | .13  | .75   |
| 50 | -.34 | .11  | .22  | -.08 | -.03 | .43  | .04  | -.08 | .17  | -.13 | -.08 | -.20 | .05  | -.25 | .14  | .55   |
| 51 | -.40 | .73  | .09  | .11  | .02  | -.09 | -.03 | -.07 | .02  | .08  | -.02 | .17  | -.01 | -.06 | -.01 | .77   |
| 52 | -.47 | .56  | .12  | -.05 | .05  | -.05 | .01  | .03  | -.08 | .02  | .10  | .04  | -.13 | .14  | -.07 | .62   |

|     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | n <sup>2</sup> |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------------|
| 53  | -26 | 13  | 07  | 01  | 04  | 12  | 11  | -27 | -03 | -30 | -03 | -04 | 08  | 05  | -07 | 31             |
| 54  | -44 | 55  | -02 | 02  | 03  | -07 | -04 | -06 | 03  | 03  | 01  | -05 | 11  | 08  | 01  | 53             |
| 55  | -20 | 08  | -47 | -18 | 02  | 16  | 34  | -05 | -27 | -21 | 18  | 04  | 17  | 01  | -09 | 63             |
| 56  | -43 | 58  | 05  | -00 | 11  | 11  | 08  | 08  | 01  | 11  | 15  | 07  | 17  | -18 | 17  | 69             |
| 57  | -21 | 41  | 04  | -50 | 16  | -04 | -01 | -15 | -22 | 15  | 11  | 00  | 37  | -53 | -32 | 1.12           |
| 58  | -15 | 45  | -15 | -25 | 08  | 08  | 02  | 17  | 01  | -12 | -09 | 03  | 20  | 06  | 10  | 43             |
| 59  | -31 | 30  | 12  | -38 | 17  | 18  | -27 | 06  | -12 | 08  | -05 | -02 | -11 | 27  | -14 | 61             |
| 60  | -16 | 30  | 01  | -29 | 04  | -05 | -30 | 25  | 02  | 09  | 02  | -24 | 01  | -05 | 06  | 43             |
| 61  | -40 | 67  | -06 | -10 | -05 | 00  | 15  | 35  | 15  | -04 | 15  | 10  | 13  | -18 | 04  | 88             |
| 62  | -18 | -09 | -05 | 22  | -09 | -10 | 03  | 04  | 16  | 13  | 09  | 32  | -03 | -09 | 02  | 27             |
| 63  | 01  | 04  | 13  | -22 | -20 | 11  | -10 | 18  | -10 | 17  | -06 | -01 | -16 | -05 | 07  | 24             |
| 64  | -10 | 15  | 08  | -06 | 07  | 04  | -12 | 35  | 11  | 01  | -15 | 15  | -02 | -09 | -06 | 26             |
| 65  | -10 | 01  | 05  | 22  | -06 | -15 | 02  | 19  | 01  | 00  | 19  | 13  | -24 | -52 | -03 | 51             |
| 66  | 25  | -21 | -08 | 51  | 09  | -10 | 10  | 20  | -30 | 05  | 03  | -03 | 12  | 06  | -05 | 56             |
| 67  | 19  | -22 | -22 | 11  | -02 | -18 | 32  | 10  | -55 | -05 | -12 | -01 | -07 | 02  | 01  | 62             |
| 68  | 28  | -11 | 02  | 56  | 22  | 19  | -25 | 11  | -16 | 09  | 13  | 01  | -04 | -02 | 05  | 62             |
| 69  | -00 | 12  | 08  | -07 | -02 | -29 | 12  | -22 | -12 | -04 | 10  | 20  | 14  | -13 | 46  | 49             |
| 70  | 49  | -16 | -04 | 05  | -11 | -19 | -17 | -03 | -16 | 06  | -02 | 04  | 19  | -10 | -07 | 43             |
| 71  | -22 | 16  | -11 | -09 | -14 | 33  | -13 | 17  | 05  | 23  | 14  | 06  | -11 | 04  | 14  | 38             |
| 72  | 16  | -04 | -12 | 22  | -22 | 10  | 44  | 09  | -03 | -08 | 10  | -11 | -04 | -09 | -06 | 39             |
| 73  | -12 | -04 | -08 | -02 | -43 | -11 | 58  | -04 | 10  | -10 | -04 | 01  | 03  | -08 | 01  | 59             |
| 74  | -24 | 03  | 20  | -12 | 00  | 28  | 03  | -01 | 12  | 14  | -17 | -00 | 29  | 42  | -10 | 53             |
| 75  | 09  | 21  | 06  | -07 | 14  | 39  | -08 | -15 | 14  | -14 | 00  | -01 | 01  | 26  | -08 | 37             |
| 76  | 07  | -15 | -08 | 08  | -05 | -27 | 14  | -13 | 02  | -01 | 30  | 03  | -08 | 12  | 14  | 28             |
| 77  | -24 | 04  | 15  | -11 | 17  | -19 | -13 | -35 | 06  | -02 | -49 | 11  | 27  | -41 | -30 | 89             |
| 78  | -16 | 18  | 08  | -53 | -04 | 06  | -02 | 01  | 11  | 02  | -08 | 24  | 08  | -08 | 33  | 55             |
| 79  | 77  | -12 | -13 | -20 | 01  | 02  | -04 | -26 | -21 | 03  | 06  | -05 | -19 | -01 | -25 | 88             |
| 80  | 64  | -16 | -13 | -18 | -04 | 27  | 07  | 11  | 04  | 19  | 03  | -13 | 05  | -33 | -13 | 76             |
| 81  | -44 | 39  | -01 | 14  | 60  | -02 | -06 | 08  | -09 | -03 | 12  | 04  | -05 | 12  | 07  | 78             |
| 82  | 02  | 05  | 18  | -21 | -03 | -13 | -19 | -26 | 75  | 06  | 19  | 06  | 04  | 42  | 18  | 1.02           |
| 83  | 13  | 08  | -11 | 19  | -19 | 13  | -11 | -14 | 21  | 18  | 02  | 07  | -06 | 15  | -15 | 29             |
| 84  | 02  | 17  | -09 | 18  | 02  | 25  | 02  | 28  | 06  | -51 | -04 | -09 | 23  | 02  | -51 | 80             |
| 85  | 05  | -08 | 14  | -27 | -05 | -12 | -20 | -23 | 80  | 01  | 10  | -01 | 25  | 14  | -04 | 95             |
| 86  | -15 | 02  | 04  | 17  | 18  | -07 | -00 | -03 | 28  | -49 | 18  | -20 | -23 | 06  | 20  | 58             |
| 87  | -17 | -07 | 04  | 10  | 40  | -06 | 11  | -25 | -12 | 08  | -10 | -11 | 03  | 01  | 03  | 33             |
| 88  | 12  | 02  | 14  | -02 | -11 | -15 | 08  | 18  | -11 | -08 | 24  | 81  | -07 | 55  | 04  | 1.15           |
| 89  | -11 | 09  | 14  | -04 | 17  | -05 | -07 | 01  | -26 | 02  | 29  | 53  | -01 | 02  | 02  | 51             |
| 90  | 72  | 10  | -10 | -14 | 18  | 19  | 05  | -03 | 10  | -15 | -06 | 37  | 11  | -06 | -03 | 82             |
| 91  | 18  | 32  | -11 | -20 | 25  | 05  | 58  | -17 | 00  | -16 | 03  | 13  | 14  | 09  | -15 | 71             |
| 92  | 02  | -12 | 24  | 01  | -11 | -08 | 02  | 13  | 05  | 20  | -16 | 01  | -40 | -25 | 13  | 42             |
| 93  | 28  | -09 | 10  | 26  | -12 | 07  | -16 | -13 | -43 | -10 | 06  | 10  | 25  | -00 | 08  | 50             |
| 94  | -02 | 10  | 01  | 25  | 09  | -12 | 62  | -06 | 09  | 15  | 04  | -06 | -31 | 09  | -10 | 63             |
| 95  | -30 | 04  | 00  | 29  | -11 | 05  | -02 | -02 | -12 | 72  | -00 | -22 | -17 | 12  | -18 | 85             |
| 96  | -26 | 03  | 00  | 28  | -12 | 04  | -06 | -01 | -10 | 71  | -02 | -26 | -16 | 10  | -14 | 81             |
| 97  | -36 | -34 | -25 | -15 | 03  | 23  | 07  | 27  | -09 | -03 | 07  | 27  | 19  | -20 | 17  | 65             |
| 98  | 23  | 25  | 06  | -18 | 16  | -07 | 65  | -19 | 09  | -08 | -15 | 10  | -17 | -14 | -03 | 74             |
| 99  | -35 | 29  | 15  | 03  | 42  | -07 | -16 | 02  | 48  | 21  | 16  | 14  | 10  | 17  | 21  | 84             |
| 100 | 16  | -22 | 03  | -28 | 07  | 03  | -02 | -16 | 39  | -05 | -28 | 01  | -16 | 18  | -04 | 48             |
| 101 | -01 | 05  | 15  | 32  | -24 | 12  | 14  | -14 | 10  | -04 | -46 | 00  | -05 | 07  | -56 | 78             |
| 102 | 89  | 08  | 17  | 21  | 12  | -07 | 03  | -15 | 04  | -07 | 04  | -02 | -10 | 24  | 14  | 1.01           |
| 103 | -21 | 33  | 03  | -01 | 01  | 06  | 25  | 403 | 29  | -14 | 13  | 12  | 51  | -03 | 00  | 62             |
| 104 | -09 | -11 | -43 | -06 | 04  | -02 | -12 | 14  | 09  | 02  | 54  | -14 | 16  | 05  | -16 | 62             |

## APPENDIX 2 C

### Rotated Factor Matrices

|     |           |   |
|-----|-----------|---|
| I   | Session 1 |   |
| II  | "         | 2 |
| III | "         | 3 |

# ROTATED FACTOR (R V) MATRIX. Session 1

|    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | h <sup>2</sup> |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------|
| 1  | 17   | -.07 | -.04 | -.04 | .51  | .37  | -.15 | -.07 | .11  | .16  | .23  | -.03 | .03  | -.14 | .25  | .64            |
| 2  | .24  | .16  | .19  | .08  | .36  | .21  | .17  | .22  | .05  | .24  | .07  | -.05 | .16  | .11  | .05  | .48            |
| 3  | .47  | .21  | -.07 | .08  | -.01 | -.18 | .20  | .30  | .26  | .15  | .09  | .24  | .05  | .02  | -.07 | .63            |
| 4  | .30  | .51  | .08  | -.16 | .06  | .16  | .07  | .30  | .11  | .06  | -.28 | .38  | .02  | -.31 | .05  | .84            |
| 5  | -.07 | .26  | -.12 | -.03 | .21  | .06  | .04  | .05  | .60  | -.01 | -.22 | .17  | .06  | .07  | .02  | .59            |
| 6  | -.09 | .62  | -.04 | -.03 | -.19 | -.29 | -.07 | -.06 | .09  | .03  | -.25 | -.02 | -.03 | -.03 | .07  | .61            |
| 7  | .04  | .69  | .04  | .07  | -.09 | -.21 | .04  | -.04 | .36  | -.05 | -.08 | .22  | -.24 | .04  | -.03 | .79            |
| 8  | -.26 | -.11 | .30  | -.04 | .31  | .27  | .06  | -.13 | .02  | -.31 | .17  | -.02 | .01  | .08  | -.13 | .51            |
| 9  | -.85 | .20  | .00  | -.01 | -.06 | -.08 | .04  | .12  | .09  | .04  | -.04 | -.02 | .09  | .09  | .02  | .82            |
| 10 | -.01 | -.11 | -.24 | .10  | -.35 | -.01 | -.24 | .11  | -.10 | .01  | .57  | .02  | .15  | .01  | .29  | .71            |
| 11 | .05  | .48  | -.05 | .03  | .09  | -.02 | -.10 | .08  | .28  | .30  | -.01 | .04  | -.06 | .04  | .05  | .44            |
| 12 | -.46 | -.46 | .05  | -.11 | -.10 | .11  | .03  | .06  | -.24 | .12  | .01  | .11  | .10  | -.23 | .21  | .66            |
| 13 | -.09 | .22  | -.08 | .05  | .38  | .16  | .00  | .18  | .01  | .29  | .04  | .15  | .15  | -.19 | .07  | .44            |
| 14 | -.35 | .29  | -.09 | .06  | -.07 | -.01 | -.12 | .10  | .07  | -.07 | -.12 | .11  | .05  | .28  | -.06 | .37            |
| 15 | .03  | .63  | .01  | -.06 | -.10 | -.31 | -.03 | .10  | -.05 | -.06 | -.01 | -.11 | -.13 | .04  | -.09 | .56            |
| 16 | -.49 | -.41 | .00  | .06  | .07  | .13  | .13  | .01  | .06  | .09  | -.13 | -.04 | .04  | -.05 | .07  | .49            |
| 17 | .03  | .08  | -.27 | .02  | .28  | .16  | -.14 | .09  | -.10 | .03  | .19  | .14  | .30  | .10  | .28  | .46            |
| 18 | -.04 | -.08 | -.18 | .03  | -.06 | .12  | -.14 | .09  | .14  | -.36 | -.01 | -.28 | .02  | .15  | .07  | .34            |
| 19 | .02  | -.02 | .02  | .02  | .00  | -.12 | .06  | .00  | -.08 | -.02 | -.94 | .09  | .02  | -.38 | -.04 | 1.06           |
| 20 | .19  | .08  | .15  | .29  | -.12 | -.06 | -.07 | .19  | .16  | .34  | .04  | .00  | -.05 | -.08 | .31  | .46            |
| 21 | .00  | .06  | .02  | .13  | .50  | .30  | .17  | -.00 | -.10 | .12  | -.08 | .05  | -.23 | .16  | -.03 | .50            |
| 22 | -.26 | .16  | -.09 | -.10 | .45  | -.06 | .28  | .13  | .14  | -.06 | -.09 | .08  | -.10 | -.12 | .18  | .51            |
| 23 | .01  | -.04 | -.12 | -.02 | .40  | -.01 | -.14 | .11  | -.08 | .06  | -.10 | -.19 | .00  | .13  | .33  | .39            |
| 24 | .01  | .08  | .06  | .02  | .10  | -.03 | -.05 | .01  | .04  | .08  | .11  | .03  | .62  | -.12 | .11  | .46            |
| 25 | -.02 | .27  | -.18 | .03  | .28  | .07  | .06  | -.01 | .07  | .01  | -.06 | -.01 | .54  | -.00 | -.00 | .49            |
| 26 | .11  | -.01 | -.28 | -.21 | -.03 | .04  | .20  | .39  | -.10 | -.16 | -.10 | .28  | .47  | -.29 | -.03 | .76            |
| 27 | -.27 | .06  | .01  | -.32 | .09  | .02  | .03  | .34  | .03  | .08  | -.05 | -.08 | .30  | -.16 | -.05 | .44            |
| 28 | .06  | -.03 | -.09 | .05  | -.03 | .01  | -.20 | .11  | -.18 | .13  | -.11 | .19  | .11  | -.22 | -.18 | .26            |
| 29 | -.17 | .26  | .12  | .11  | .50  | .16  | .07  | -.10 | .07  | .15  | .00  | -.13 | .09  | .07  | .03  | .47            |
| 30 | .03  | .41  | -.16 | .05  | .22  | .15  | .06  | -.02 | -.03 | .10  | .08  | .07  | -.03 | .05  | .09  | .31            |
| 31 | -.20 | .21  | .06  | .13  | -.06 | -.34 | .10  | -.07 | .18  | .34  | -.10 | -.06 | .09  | -.12 | .10  | .43            |
| 32 | -.19 | .02  | -.05 | .26  | -.25 | -.28 | .20  | .28  | -.08 | .15  | .01  | -.01 | .03  | -.18 | -.00 | .43            |
| 33 | -.23 | .23  | .07  | -.12 | .13  | -.32 | .23  | .12  | .07  | .29  | .14  | -.04 | -.16 | .01  | -.11 | .46            |
| 34 | -.28 | .26  | -.05 | -.02 | .16  | .03  | .03  | .06  | -.09 | -.19 | -.02 | -.22 | .38  | .24  | .43  | .66            |
| 35 | .08  | .03  | .08  | -.04 | .18  | .08  | .41  | .14  | .18  | -.01 | -.03 | -.01 | .04  | .15  | -.13 | .31            |
| 36 | .15  | -.01 | -.08 | -.54 | -.10 | -.05 | .07  | -.24 | .09  | -.27 | -.06 | -.04 | -.23 | .04  | -.18 | .57            |
| 37 | -.18 | -.32 | -.05 | .35  | .15  | .06  | .06  | .09  | -.09 | .18  | .08  | -.06 | .08  | .13  | .02  | .35            |
| 38 | .14  | .43  | .17  | -.49 | -.14 | .06  | -.04 | .03  | .08  | -.31 | .22  | -.03 | -.10 | .02  | .10  | .67            |
| 39 | .11  | .03  | -.05 | -.59 | .03  | -.01 | -.00 | -.12 | -.17 | .18  | .07  | .10  | -.04 | -.05 | .01  | .46            |
| 40 | .02  | .40  | .27  | -.52 | .11  | .08  | -.12 | .05  | -.03 | .20  | .01  | -.07 | -.03 | -.06 | -.05 | .59            |
| 41 | .03  | -.04 | .05  | -.82 | -.02 | -.10 | .02  | .13  | -.04 | .00  | -.11 | -.05 | -.09 | -.08 | .00  | .74            |
| 42 | -.09 | -.05 | -.01 | -.70 | -.15 | .04  | .04  | .02  | -.09 | .07  | -.07 | -.00 | .08  | .16  | .15  | .60            |
| 43 | -.01 | .20  | .23  | -.07 | .05  | -.11 | .15  | -.29 | -.13 | -.32 | .04  | -.22 | -.09 | -.11 | -.08 | .42            |
| 44 | -.13 | .25  | .06  | .09  | -.03 | -.23 | .02  | .07  | -.15 | -.16 | -.07 | -.14 | -.15 | -.36 | -.34 | .49            |
| 45 | -.01 | .20  | .04  | .07  | .09  | .05  | .05  | .60  | -.20 | -.10 | .12  | -.03 | -.16 | -.01 | -.28 | .59            |
| 46 | .01  | -.00 | .02  | -.08 | .07  | -.00 | .05  | -.57 | -.08 | -.27 | .05  | -.10 | .00  | -.17 | .11  | .47            |
| 47 | -.11 | .12  | .02  | .02  | .08  | .01  | .01  | .03  | .07  | .76  | .08  | -.37 | -.01 | .16  | .06  | .79            |
| 48 | -.10 | .03  | .02  | -.10 | -.16 | -.02 | -.15 | .07  | .10  | -.43 | .04  | .02  | .04  | .12  | .14  | .31            |

|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 49 | -07 | 12  | 02  | 06  | 31  | -04 | -09 | -03 | 04  | 06  | -23 | -22 | 41  | 02  | 03  | 41   |
| 50 | -14 | 03  | 03  | -07 | 05  | -06 | 22  | -01 | -12 | 04  | -18 | -12 | -27 | -18 | 09  | 26   |
| 51 | 09  | 06  | -59 | 04  | 12  | 04  | -15 | -06 | -02 | 18  | 11  | -18 | -10 | -05 | 11  | 51   |
| 52 | 03  | 12  | -00 | -02 | -35 | 09  | 56  | 06  | 29  | -03 | -06 | 07  | -09 | -61 | 01  | 94   |
| 53 | 00  | -03 | -02 | -03 | 00  | 53  | 04  | 09  | -31 | -17 | -06 | 22  | 28  | 50  | 05  | 80   |
| 54 | 10  | 06  | -00 | -04 | 45  | 02  | 11  | 19  | -06 | -10 | 08  | -29 | 02  | -06 | 12  | 39   |
| 55 | 05  | -03 | -24 | 11  | -04 | -12 | -00 | -27 | 10  | 02  | -00 | -04 | 01  | -47 | -09 | 40   |
| 56 | -24 | 13  | -03 | -08 | -04 | 25  | 09  | -10 | -16 | -12 | 16  | -12 | -02 | 34  | 28  | 44   |
| 57 | 02  | -02 | 07  | 15  | 06  | 14  | -07 | -09 | 27  | -16 | -12 | -08 | 11  | -10 | -05 | 21   |
| 58 | 05  | -00 | 05  | -02 | 02  | 78  | -13 | -11 | 08  | 04  | 08  | -05 | -03 | 04  | -30 | 75   |
| 59 | 05  | -12 | 02  | 08  | -02 | -80 | -00 | -06 | 08  | -13 | 03  | -11 | 06  | 06  | 08  | 72   |
| 60 | -23 | 00  | 06  | 06  | -40 | -25 | -02 | -08 | 17  | 10  | 08  | -11 | -00 | 01  | 15  | 37   |
| 61 | 13  | -13 | 10  | 11  | -05 | -73 | 05  | 07  | 09  | 06  | -02 | -04 | -09 | -20 | -16 | 69   |
| 62 | 04  | -08 | 05  | -03 | -10 | -00 | 01  | -00 | 04  | -09 | 04  | 80  | -02 | 07  | -15 | 70   |
| 63 | 10  | -65 | 12  | 01  | -13 | -04 | -09 | 02  | 58  | 14  | 05  | -25 | 02  | 17  | -35 | 1.05 |
| 64 | -29 | -11 | 05  | -21 | 11  | -07 | -04 | -05 | -33 | 24  | -07 | -31 | -40 | 03  | 02  | 59   |
| 65 | 12  | -10 | -14 | 08  | 12  | -09 | 03  | 30  | -12 | 12  | -18 | 21  | 07  | 16  | 04  | 30   |
| 66 | 18  | 14  | 00  | -05 | -03 | 15  | -02 | -12 | -25 | -09 | 15  | 29  | 22  | -17 | 07  | 35   |
| 67 | -01 | -11 | 01  | -12 | -27 | -19 | -08 | 16  | -13 | -16 | 12  | 13  | 02  | -01 | -06 | 25   |
| 68 | -08 | 03  | 05  | -04 | 20  | 09  | 37  | -16 | -27 | -09 | 13  | -00 | 14  | 12  | 02  | 35   |
| 69 | -04 | -04 | -36 | -28 | 18  | 22  | -01 | 08  | -52 | 24  | 60  | -04 | 08  | 09  | -06 | 1.01 |
| 70 | 03  | 68  | 05  | -31 | 33  | 07  | 00  | 43  | -04 | 14  | 11  | -00 | -04 | -28 | 40  | 1.13 |
| 71 | 40  | 02  | -20 | -32 | 10  | 01  | 03  | 06  | 57  | -05 | 06  | -34 | -44 | -04 | 07  | 96   |
| 72 | 19  | 21  | -31 | -02 | -24 | 09  | 26  | -08 | -02 | 31  | 38  | 24  | -32 | -09 | -02 | 73   |
| 73 | 42  | 02  | -06 | -02 | 08  | -02 | 62  | 28  | 06  | 01  | -01 | -11 | 07  | -09 | 10  | 69   |
| 74 | 28  | 05  | -02 | -03 | 05  | 21  | -13 | 25  | 09  | 34  | 04  | -10 | 01  | 06  | 07  | 35   |
| 75 | 63  | -14 | 04  | 15  | -02 | 06  | 63  | 09  | -01 | 03  | 08  | 06  | 04  | -06 | 03  | 87   |
| 76 | 53  | -16 | 01  | -09 | 15  | 27  | 17  | 07  | 11  | 08  | -15 | -08 | 23  | -08 | -07 | 56   |
| 77 | 08  | 24  | -08 | -00 | -25 | -05 | 46  | 43  | -35 | 17  | -04 | 40  | -03 | -05 | 13  | 87   |
| 78 | 50  | 07  | -10 | -06 | 19  | -00 | 37  | 46  | -14 | 16  | -09 | 10  | 06  | 00  | 10  | 73   |
| 79 | -53 | 17  | -09 | 01  | 13  | 02  | -24 | -09 | 04  | -45 | 04  | -13 | -19 | 00  | -09 | 67   |
| 80 | 31  | 04  | -08 | -30 | 29  | -03 | 20  | 36  | 08  | -09 | 18  | -19 | 02  | 28  | 03  | 61   |
| 81 | 07  | 11  | -03 | -34 | 09  | 02  | 42  | -09 | -14 | -03 | 16  | -21 | 19  | -28 | 11  | 54   |
| 82 | 16  | 22  | 05  | 08  | -23 | -20 | 03  | 07  | 16  | -29 | 28  | 09  | -19 | 02  | 00  | 41   |
| 83 | 06  | 36  | 21  | 07  | 08  | 06  | 04  | -10 | 09  | -03 | 28  | 03  | -21 | 12  | -01 | 35   |
| 84 | -09 | 01  | 00  | -17 | 11  | -05 | -14 | 07  | -04 | -06 | 05  | 38  | -09 | -16 | 26  | 44   |
| 85 | 16  | 09  | 18  | -03 | 35  | -05 | -54 | -04 | -15 | -18 | 03  | -05 | 16  | -04 | -12 | 59   |
| 86 | 02  | -07 | -87 | 03  | -05 | 04  | 05  | 06  | -07 | 02  | -03 | 03  | 05  | 03  | -01 | 78   |
| 87 | -10 | -05 | -81 | -04 | 07  | -06 | 03  | -06 | 16  | -03 | 04  | -03 | -06 | 12  | -03 | 73   |
| 88 | 02  | 06  | 09  | 09  | -07 | 09  | 05  | -09 | -39 | -00 | -02 | -13 | -07 | 01  | 63  | 62   |
| 89 | -13 | 61  | 07  | 06  | 11  | 33  | 37  | 04  | -34 | -34 | -12 | 07  | 12  | 09  | 37  | 1.07 |
| 90 | 15  | -08 | 05  | 04  | -07 | 03  | 04  | -07 | 04  | 29  | 05  | -41 | -08 | 09  | -23 | 37   |
| 91 | 08  | 16  | -43 | -04 | 15  | -04 | -43 | 13  | -20 | -17 | 12  | 13  | 06  | -29 | 12  | 65   |
| 92 | 46  | 14  | -07 | -11 | 17  | -04 | 40  | 38  | -07 | 02  | 16  | 12  | -07 | -00 | 11  | 65   |
| 93 | 25  | 27  | 07  | 28  | -03 | -06 | 90  | 15  | -00 | -04 | -22 | -16 | -24 | -12 | -11 | 1.22 |
| 94 | -16 | 01  | 01  | -31 | 07  | -08 | 15  | 09  | 05  | -22 | 41  | 10  | -27 | -15 | 15  | 51   |
|    | 46  | 43  | 67  | 62  | 46  | 57  | 52  | 56  | 53  | 45  | 56  | 49  | 59  | 49  | 56  | 56%  |

ROTATED FACTOR (R.V) MATRIX. Session 2

|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1  | 06  | -42 | -02 | 15  | 10  | -06 | -26 | -06 | -23 | -14 | 08  | -07 | -14 | -03 | 03  | 07  | 05  |
| 2  | 31  | -24 | -07 | 08  | 05  | -08 | 20  | -04 | -06 | 30  | 11  | 17  | -02 | -10 | -39 | -33 | -05 |
| 3  | 23  | -04 | -14 | 01  | 07  | 04  | -21 | -08 | -06 | 06  | 23  | 43  | 16  | -04 | -59 | -01 | -11 |
| 4  | 10  | -11 | 03  | 04  | -17 | -11 | -46 | -02 | 06  | -10 | -02 | 34  | -42 | -05 | -16 | -07 | -07 |
| 5  | 10  | 06  | -33 | 29  | -08 | 06  | -09 | 03  | -03 | 15  | 09  | 44  | -06 | -33 | -20 | 09  | -05 |
| 6  | 10  | 36  | -58 | 21  | 05  | 52  | -05 | -05 | 06  | -06 | -19 | 10  | -03 | 37  | -07 | 04  | 04  |
| 7  | 19  | 18  | -45 | -09 | -04 | 26  | -21 | 01  | -05 | 01  | -05 | 48  | -18 | 02  | -18 | -03 | 21  |
| 8  | -06 | -32 | 05  | 23  | 01  | -24 | 10  | -02 | -10 | -40 | 10  | -33 | 03  | -04 | 17  | 04  | -17 |
| 9  | -05 | -02 | -30 | 13  | 01  | 09  | 46  | 06  | 03  | -13 | 11  | 04  | -13 | -10 | 22  | 13  | -09 |
| 10 | -22 | -04 | 02  | 51  | -03 | -09 | 35  | 13  | 09  | -30 | -03 | -07 | -19 | 06  | -09 | -05 | -38 |
| 11 | -02 | -03 | -58 | -19 | 01  | 08  | -01 | 01  | 14  | -07 | -17 | 44  | -19 | 21  | -31 | 09  | -07 |
| 12 | -03 | -05 | 10  | 51  | 14  | 04  | 22  | 09  | 01  | 01  | 03  | -33 | 01  | 30  | -31 | 04  | 00  |
| 13 | -05 | -37 | -37 | 04  | 19  | 01  | -08 | -04 | -08 | -26 | 04  | 00  | -22 | -19 | -01 | 25  | -08 |
| 14 | 08  | 31  | -09 | 05  | -43 | 03  | 01  | 02  | 20  | 08  | 02  | 19  | -07 | 06  | -30 | 07  | -32 |
| 15 | 17  | 14  | -31 | -49 | 03  | 19  | 00  | -01 | -02 | -11 | -04 | -01 | 03  | 00  | 29  | -08 | 12  |
| 16 | 00  | -07 | -02 | 62  | 08  | 07  | 26  | 02  | 10  | -01 | -09 | -04 | -06 | 19  | -12 | 03  | -02 |
| 17 | 08  | -10 | -08 | -05 | -14 | -16 | -05 | -06 | -15 | 08  | 06  | -23 | -07 | -05 | -05 | -01 | -15 |
| 18 | -10 | -02 | 25  | 04  | -40 | -08 | 05  | 06  | -02 | 14  | -23 | 02  | -04 | 23  | 09  | 06  | -10 |
| 19 | -08 | 22  | 06  | 09  | -05 | 15  | -01 | 13  | -01 | 33  | 28  | 07  | 01  | -25 | 10  | 20  | -21 |
| 20 | 36  | -21 | 06  | 22  | -10 | 09  | 06  | -06 | -21 | 28  | 04  | 09  | 23  | -19 | 03  | -16 | -15 |
| 21 | 25  | -35 | -35 | 07  | 09  | -01 | -01 | 08  | 15  | -14 | 07  | -09 | -06 | 09  | 10  | -02 | -10 |
| 22 | 07  | -30 | -45 | -08 | 12  | 08  | 09  | 15  | -11 | -07 | 01  | -12 | 22  | 09  | 01  | 17  | 09  |
| 23 | 08  | -27 | -16 | -08 | 01  | -07 | 19  | 27  | -02 | -07 | 08  | 05  | -04 | 09  | 42  | -45 | -24 |
| 24 | -19 | -02 | 01  | -06 | -01 | -08 | 07  | -03 | -08 | -49 | -06 | 00  | -08 | -33 | -07 | -09 | -21 |
| 25 | -31 | -08 | -33 | -20 | 09  | 05  | -07 | -05 | 10  | -19 | -07 | -02 | 07  | -51 | 03  | 22  | -31 |
| 26 | -09 | -05 | -08 | -28 | 35  | 07  | 01  | -12 | -08 | -31 | -20 | 06  | -12 | -04 | 10  | 25  | -36 |
| 27 | 06  | 00  | -20 | 12  | 15  | 10  | 00  | 08  | -01 | 04  | -18 | 10  | 03  | 18  | -08 | 32  | -60 |
| 28 | 11  | 12  | 01  | 00  | -02 | 18  | 12  | -12 | -02 | 00  | -14 | 01  | -44 | 25  | -07 | -03 | -13 |
| 29 | 05  | -22 | -32 | -04 | 09  | 09  | 10  | 02  | -03 | 00  | -07 | 17  | 09  | -39 | 08  | 06  | 04  |
| 30 | 05  | 03  | -31 | -03 | -06 | 04  | -23 | -10 | 02  | 09  | 05  | 03  | 24  | -33 | -11 | 06  | -08 |
| 31 | 03  | -06 | -25 | 14  | 19  | 16  | 00  | -05 | -06 | 07  | -07 | 28  | -09 | -09 | 18  | 09  | 00  |
| 32 | 08  | 05  | -05 | 04  | 08  | 29  | 08  | 04  | -10 | 22  | 07  | 16  | 02  | 32  | -35 | 04  | -10 |
| 33 | 61  | 02  | -09 | -14 | -15 | -15 | -05 | -27 | 04  | -10 | 08  | -05 | 01  | -20 | 30  | -02 | 04  |
| 34 | 06  | -11 | -05 | -26 | -04 | -20 | 05  | 01  | 03  | -01 | 37  | 17  | -18 | -09 | -09 | 41  | -37 |
| 35 | 52  | -10 | -17 | -08 | 10  | -02 | 09  | -48 | -28 | -29 | -18 | -32 | 13  | -04 | 16  | -02 | 05  |
| 36 | 46  | 08  | 08  | -21 | -23 | -10 | -18 | -35 | 04  | 02  | 05  | 01  | 12  | -07 | 15  | 06  | -23 |
| 37 | 48  | -05 | 22  | -06 | 02  | -04 | -09 | 19  | 01  | -02 | 10  | -02 | -10 | 06  | -02 | 09  | 00  |
| 38 | 66  | 00  | -07 | 11  | 10  | -09 | -06 | -14 | -17 | -08 | 15  | -03 | -11 | -26 | 04  | -08 | -06 |
| 39 | 01  | -10 | 10  | 04  | 35  | 76  | -08 | 05  | 15  | 02  | 12  | -01 | -10 | 02  | 06  | -06 | 12  |
| 40 | 53  | 10  | -05 | 04  | 05  | -20 | -07 | -15 | -10 | -21 | 09  | 01  | -06 | -23 | 01  | -04 | 08  |
| 41 | 71  | 01  | -01 | 02  | 00  | -14 | -03 | 04  | -41 | -10 | 13  | -29 | -05 | -08 | 03  | -26 | 07  |
| 42 | 64  | -09 | 08  | 21  | 00  | -01 | 06  | 20  | -44 | -02 | -02 | 14  | -25 | -33 | 03  | -28 | 09  |
| 43 | 01  | 25  | -05 | 02  | 09  | -30 | -09 | 12  | 27  | -20 | -04 | 31  | -01 | 00  | -31 | 00  | -16 |
| 44 | 42  | 00  | -05 | -26 | -09 | -32 | 04  | -03 | -35 | -07 | 07  | -02 | -04 | -01 | -17 | 03  | 03  |
| 45 | 56  | 04  | 07  | -09 | -06 | 09  | -06 | -05 | -14 | 05  | 01  | -02 | -03 | 00  | 18  | 03  | -08 |
| 46 | -07 | -49 | 00  | -01 | -17 | -13 | -25 | 15  | -09 | 49  | 41  | 02  | -05 | -09 | -08 | 27  | 01  |
| 47 | 32  | -08 | 48  | 11  | 07  | 03  | 02  | 11  | -26 | 01  | -09 | -10 | 09  | -04 | 00  | -09 | 11  |
| 48 | 26  | -39 | -06 | 25  | 20  | -14 | -25 | 07  | 02  | 01  | -04 | -06 | 10  | 26  | -17 | 13  | 02  |
| 49 | -05 | -11 | 08  | 06  | -03 | 08  | 08  | -46 | 09  | -06 | -04 | 31  | 01  | -04 | 33  | 08  | 00  |
| 50 | -09 | -23 | 23  | 22  | 16  | -18 | 44  | -09 | 21  | -13 | -02 | 18  | -33 | -06 | -03 | -02 | -07 |
| 51 | 64  | -09 | -10 | 03  | 07  | 04  | -08 | 05  | 09  | -10 | -31 | 44  | 14  | 32  | -20 | 01  | 24  |
| 52 | 00  | 02  | -29 | -44 | 00  | 04  | 08  | -06 | -42 | 06  | -10 | -02 | 05  | -16 | -22 | 34  | 27  |

| 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 53  | 09  | -26 | 22  | -16 | 23  | -02 | -39 | 10  | 17  | 01  | 10  | -23 | 16  | -03 | 46  | -28 | -07 |
| 54  | -03 | 07  | 06  | 63  | -06 | 01  | 03  | -09 | -01 | 16  | 05  | 01  | -05 | -10 | 06  | -09 | -01 |
| 55  | -11 | 10  | 42  | 17  | -23 | -06 | 19  | 03  | 11  | 03  | 53  | 10  | -41 | -08 | -08 | -22 | 08  |
| 56  | 15  | 04  | 09  | -07 | -04 | -04 | 08  | 11  | 11  | -01 | 29  | 07  | 23  | -04 | -12 | -25 | -14 |
| 57  | 01  | 12  | 23  | -06 | -35 | -05 | -14 | -21 | 16  | -29 | -21 | -21 | -09 | -09 | -11 | -07 | -24 |
| 58  | -22 | 15  | -07 | 61  | 24  | 12  | -24 | -04 | 50  | -08 | 45  | 23  | 04  | -18 | -08 | 02  | -09 |
| 59  | 15  | -06 | 64  | 00  | 07  | 10  | -08 | -01 | -04 | -01 | -14 | 07  | -14 | -48 | -01 | 03  | 20  |
| 60  | -13 | 01  | 36  | -09 | -08 | -13 | -26 | -01 | -01 | 59  | 01  | 06  | 06  | -44 | 00  | 13  | 02  |
| 61  | 10  | -20 | 57  | -39 | 03  | -09 | -04 | 40  | -03 | -02 | 10  | -19 | -03 | 03  | -05 | 04  | 07  |
| 62  | 25  | -02 | 63  | -04 | 11  | 05  | -40 | 11  | 08  | -05 | 27  | -26 | -05 | -31 | -18 | 09  | 27  |
| 63  | 04  | 03  | -09 | -03 | 12  | -01 | -33 | 08  | 21  | -11 | 46  | -32 | 08  | 09  | -04 | -03 | 01  |
| 64  | -05 | 13  | 38  | 08  | 05  | 19  | 09  | 04  | -37 | 05  | 15  | 00  | -05 | -47 | 05  | -28 | 21  |
| 65  | -18 | 20  | -02 | -09 | 04  | -07 | 08  | -08 | 15  | 38  | -09 | -08 | -08 | -08 | 15  | -04 | -10 |
| 66  | -01 | 04  | 10  | -42 | 20  | -05 | -27 | 03  | 17  | -01 | 39  | -16 | 03  | 00  | -26 | 35  | -07 |
| 67  | 19  | -14 | 49  | -23 | -10 | -07 | -04 | 35  | -08 | 04  | -04 | -28 | 08  | 10  | -07 | -02 | -10 |
| 68  | 06  | 24  | -15 | 10  | 10  | 35  | -05 | -04 | 29  | 10  | 18  | 01  | 06  | 27  | 30  | 23  | 00  |
| 69  | 29  | -06 | 06  | -26 | 02  | -02 | 22  | -14 | -20 | -20 | -14 | -27 | 23  | -02 | -10 | 06  | -01 |
| 70  | 38  | -10 | -05 | -19 | 13  | 06  | 26  | -02 | 00  | -10 | -03 | 05  | 23  | -32 | 24  | -22 | 33  |
| 71  | 32  | 10  | -07 | 60  | 07  | -02 | 01  | 09  | 19  | 12  | 30  | 27  | 12  | 37  | 18  | -22 | 34  |
| 72  | 20  | 03  | 01  | -04 | 03  | 05  | -13 | 03  | 07  | -09 | -09 | 03  | -03 | 30  | 04  | 26  | 36  |
| 73  | 39  | -18 | 10  | -10 | -15 | -15 | -22 | 05  | 02  | -34 | -40 | 21  | -39 | -12 | -12 | 05  | 21  |
| 74  | -13 | 08  | 15  | 19  | 07  | 00  | 21  | 10  | 16  | 30  | 30  | 03  | -08 | 02  | -19 | 06  | 12  |
| 75  | -06 | 06  | 10  | 04  | 08  | -19 | 06  | -06 | 81  | -11 | 13  | 09  | -04 | -31 | -14 | 00  | 12  |
| 76  | 08  | -08 | 06  | -07 | -04 | -24 | -02 | -04 | -58 | 14  | 32  | 03  | 03  | 05  | -08 | 07  | 10  |
| 77  | -03 | -07 | 00  | -10 | 06  | 09  | 08  | -01 | -60 | 05  | 03  | 00  | -06 | 45  | 02  | 05  | -11 |
| 78  | -33 | 01  | 25  | -03 | 20  | -09 | -23 | -06 | 15  | -02 | -09 | -35 | 09  | 01  | 38  | -06 | 12  |
| 79  | 31  | -10 | -10 | -09 | -13 | 00  | 09  | 03  | -04 | 00  | 13  | 17  | 15  | -18 | 00  | -04 | 00  |
| 80  | 13  | 55  | -16 | -05 | 09  | -13 | -03 | 17  | 04  | -07 | -10 | 03  | -03 | 05  | -09 | -05 | 03  |
| 81  | -14 | -29 | -15 | 00  | -24 | -18 | 07  | -03 | 18  | 10  | 12  | -06 | 28  | 41  | -20 | 02  | -09 |
| 82  | 07  | -03 | -04 | -10 | -55 | -05 | 27  | 00  | 08  | 08  | -01 | 20  | 00  | 02  | 02  | 04  | 10  |
| 83  | -03 | 05  | -24 | 09  | 33  | 04  | 31  | 28  | 04  | 06  | 19  | 09  | 01  | -29 | 39  | -01 | 03  |
| 84  | -04 | 44  | -33 | -07 | 22  | -04 | 10  | 09  | -10 | -10 | -24 | -04 | -05 | -05 | 10  | -10 | 00  |
| 85  | 16  | 63  | 08  | 04  | -02 | 09  | -09 | 07  | -07 | 10  | 09  | 03  | 00  | -44 | 20  | -06 | -01 |
| 86  | 23  | -05 | -14 | -18 | 07  | -13 | 01  | 12  | -03 | -11 | 20  | 01  | -12 | -05 | -18 | 14  | 02  |
| 87  | 08  | 42  | -23 | -17 | 09  | -16 | -01 | 05  | 03  | -24 | -04 | -03 | -15 | -03 | -09 | -07 | 02  |
| 88  | -06 | 62  | 03  | -07 | -16 | 09  | 00  | -01 | -17 | -09 | 04  | 03  | 04  | -45 | 05  | -15 | 01  |
| 89  | -11 | 82  | -10 | 02  | -09 | 00  | 03  | 23  | 05  | 14  | 09  | 02  | 06  | -21 | -26 | -02 | 02  |
| 90  | -06 | 29  | -05 | -09 | -03 | -15 | -25 | -20 | 00  | -22 | -33 | -17 | -16 | -09 | -18 | 06  | 22  |
| 91  | 09  | 47  | 07  | 07  | -07 | 19  | 51  | -01 | 00  | 21  | -11 | 09  | 08  | -17 | -35 | -27 | -08 |
| 92  | -05 | -31 | 03  | 07  | -30 | 05  | -15 | -30 | 12  | 04  | 19  | 03  | -20 | -03 | 33  | 03  | 16  |
| 93  | 06  | 13  | 05  | 04  | 07  | -12 | 05  | -01 | 11  | -07 | -25 | 12  | 67  | 05  | -13 | -07 | -27 |
| 94  | 06  | 07  | 02  | -11 | 17  | -07 | 09  | 57  | -15 | -08 | 06  | 04  | -14 | -08 | 00  | -17 | 05  |
| 95  | -04 | 16  | 15  | 01  | -17 | -18 | -09 | -11 | 07  | 07  | -06 | -03 | 42  | 02  | 02  | 06  | 33  |
| 96  | 03  | 02  | -02 | 10  | -05 | 27  | 00  | -03 | -07 | 22  | -04 | 03  | 07  | -25 | -02 | -02 | -18 |
| 97  | -23 | 03  | -01 | -24 | 05  | -46 | -28 | -02 | -05 | 14  | 10  | 03  | -05 | -14 | 04  | 27  | -02 |
| 98  | -01 | 04  | 00  | 00  | -46 | -79 | -06 | -02 | 03  | -03 | -02 | 09  | -08 | 06  | 03  | -08 | -05 |
| 99  | -03 | 03  | -10 | 00  | 25  | -08 | -23 | -16 | -19 | 10  | 14  | -20 | 30  | -17 | -04 | 24  | 03  |
| 100 | 27  | 31  | 07  | 03  | -12 | -07 | 29  | -34 | -10 | 11  | 04  | 00  | -01 | -01 | -35 | -25 | -11 |
| 101 | -04 | -08 | 03  | -20 | 19  | 14  | -09 | 81  | 09  | 08  | -10 | 01  | 18  | -43 | 05  | -04 | 04  |
| 102 | 01  | 50  | -26 | 02  | 61  | 06  | -01 | -16 | 04  | -05 | 00  | 27  | -24 | 14  | -46 | 37  | -18 |
| 103 | -30 | 30  | 07  | -31 | -14 | -13 | 13  | -09 | 07  | -08 | 12  | -08 | -15 | 07  | -20 | 24  | -01 |
| 104 | 31  | 07  | -09 | -18 | 00  | 14  | -01 | 05  | -15 | 06  | 05  | 04  | 09  | -30 | -06 | 17  | -18 |

# FINAL ROTATED FACTOR ( R V ) MATRIX. Session 3

|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1  | 30  | -12 | -11 | -07 | 05  | -28 | -39 | -07 | -05 | -19 | 09  | -29 | 12  | 21  | 06  |
| 2  | 46  | 06  | -42 | -40 | -02 | -10 | 06  | -01 | -04 | -32 | 03  | 06  | -06 | 04  | 06  |
| 3  | -06 | -39 | 04  | 45  | -27 | -04 | -21 | 20  | -02 | -10 | -36 | -38 | 02  | 07  | -29 |
| 4  | 23  | 07  | -19 | 09  | -27 | 23  | -29 | 01  | -06 | 05  | 01  | -47 | 22  | 03  | 03  |
| 5  | -05 | -08 | 01  | -02 | -40 | 06  | -12 | 09  | 00  | -01 | 08  | -47 | -02 | 03  | -16 |
| 6  | -00 | 02  | 10  | 24  | -16 | 05  | 27  | -08 | 00  | 30  | 03  | -37 | 07  | -01 | -10 |
| 7  | 09  | -08 | 10  | 50  | -25 | 10  | 05  | -03 | 04  | 25  | 06  | -56 | 02  | -05 | -03 |
| 8  | 28  | -00 | -06 | -53 | -46 | -03 | -09 | -18 | -11 | -06 | -07 | 02  | 20  | -07 | 03  |
| 9  | -13 | -16 | 07  | -50 | -04 | 07  | 37  | -02 | 04  | 05  | 09  | 05  | -23 | -05 | -10 |
| 10 | -07 | -02 | -06 | -58 | -02 | 05  | 01  | -05 | 18  | -02 | 02  | 16  | 04  | 09  | 05  |
| 11 | 03  | -21 | -24 | 23  | -41 | -02 | 06  | -07 | 02  | 29  | -06 | -28 | -39 | -04 | 11  |
| 12 | -08 | -07 | -03 | -60 | 24  | 02  | -03 | 00  | -08 | -06 | 16  | 36  | 00  | 07  | -08 |
| 13 | 24  | -08 | -19 | -38 | 02  | -11 | -08 | -19 | 03  | -05 | 10  | -29 | -23 | 02  | -01 |
| 14 | 12  | 02  | -08 | -02 | -04 | 27  | 06  | -10 | -02 | 36  | 08  | -16 | 01  | -14 | 10  |
| 15 | 02  | 10  | 07  | 48  | 05  | -00 | 24  | -00 | 07  | 18  | -07 | -35 | -12 | -10 | 08  |
| 16 | -06 | -13 | -05 | -65 | 03  | -03 | -12 | -13 | -08 | 07  | 18  | 27  | -12 | 00  | -06 |
| 17 | 07  | -10 | -19 | -00 | -08 | 05  | 07  | -06 | 11  | -10 | -21 | 01  | 09  | 01  | -06 |
| 18 | -22 | 04  | 06  | -10 | -16 | 06  | 08  | 10  | -04 | -08 | -19 | 27  | 39  | -29 | -04 |
| 19 | -20 | 07  | 12  | -07 | -06 | 09  | -31 | -15 | -07 | 26  | 29  | -07 | -35 | 15  | 06  |
| 20 | 19  | -10 | 08  | 08  | -27 | -31 | -10 | -28 | -03 | -30 | -01 | -03 | 11  | -07 | 04  |
| 21 | 34  | -21 | -12 | -23 | -05 | -17 | -06 | -26 | -23 | 03  | -09 | -05 | -03 | -09 | 17  |
| 22 | -03 | -15 | -25 | -42 | 07  | -05 | 16  | -18 | -20 | -39 | -09 | -17 | 09  | -12 | -09 |
| 23 | 04  | -05 | 06  | -06 | -03 | -08 | -07 | -13 | 20  | -05 | -02 | -14 | 18  | 00  | -07 |
| 24 | 07  | -02 | -11 | -08 | 03  | 06  | 18  | 46  | 22  | -06 | 07  | 06  | -28 | -00 | -06 |
| 25 | -04 | -10 | -26 | 04  | -19 | -07 | 21  | -04 | 24  | 09  | -05 | -11 | -50 | 02  | 04  |
| 26 | 11  | 25  | 06  | 02  | -26 | 07  | 01  | 10  | 05  | 10  | 00  | -02 | -24 | 22  | -00 |
| 27 | -01 | 08  | 01  | -25 | 06  | -18 | 05  | 03  | -02 | -15 | 20  | -07 | -07 | -09 | -03 |
| 28 | 19  | -14 | 19  | -10 | -08 | 08  | -03 | -11 | -22 | 22  | -13 | 02  | -10 | 23  | 02  |
| 29 | 23  | -06 | -20 | -14 | -03 | -20 | 09  | -30 | -04 | -06 | 08  | -10 | -22 | -24 | 09  |
| 30 | -06 | 07  | -29 | 10  | -10 | 03  | 17  | -20 | -03 | -07 | 04  | -12 | -08 | -24 | -04 |
| 31 | -06 | -16 | -05 | 14  | -11 | 06  | 07  | -04 | 04  | 18  | 48  | -08 | -54 | 03  | 09  |
| 32 | 05  | -24 | 22  | 16  | -07 | -06 | 04  | -01 | 09  | -06 | 10  | 28  | -34 | -10 | 03  |
| 33 | 34  | 07  | 09  | 37  | -02 | -02 | -26 | -03 | 02  | 11  | -10 | 03  | -75 | 09  | 29  |
| 34 | 07  | -52 | 01  | -17 | 06  | -07 | 08  | -15 | -09 | 41  | -03 | 01  | -07 | -23 | 01  |
| 35 | 04  | -43 | 06  | -20 | 29  | -07 | -19 | -01 | 09  | -05 | -18 | 16  | 07  | -05 | -14 |
| 36 | -03 | 81  | -03 | -02 | -02 | -31 | 04  | -07 | 05  | -18 | -05 | -01 | 12  | -01 | -06 |
| 37 | 05  | 74  | 06  | 13  | 02  | -08 | 01  | 12  | 18  | 01  | 05  | -03 | -04 | 04  | -05 |
| 38 | 07  | 56  | -06 | 02  | -08 | -01 | 01  | 07  | -08 | -39 | -03 | 40  | 47  | -10 | 08  |
| 39 | 09  | 54  | -01 | 18  | -05 | -04 | 03  | -08 | 06  | -10 | -07 | -28 | -00 | 06  | -07 |
| 40 | 07  | 52  | -18 | -09 | 02  | 10  | -05 | 05  | -05 | -04 | -37 | 04  | -10 | -07 | 11  |
| 41 | -10 | 78  | -08 | 15  | 07  | -06 | -01 | -01 | 07  | -06 | 13  | -02 | -03 | -07 | -09 |
| 42 | 08  | 70  | -05 | 07  | -00 | -04 | 05  | 07  | 02  | 08  | 06  | -05 | -02 | -10 | 09  |
| 43 | 42  | 00  | -03 | -07 | 09  | 04  | 10  | 03  | -36 | 03  | 03  | 37  | -10 | -40 | 10  |
| 44 | 10  | 10  | -10 | 01  | 21  | -28 | -13 | 09  | -03 | -23 | -27 | -28 | 03  | 01  | -05 |
| 45 | 01  | 09  | 08  | 08  | 10  | -02 | -07 | -21 | 01  | 07  | -42 | 00  | -47 | -02 | 07  |
| 46 | 08  | -04 | 06  | 07  | 41  | 51  | 10  | -21 | 04  | -06 | -03 | -05 | -18 | -13 | -50 |
| 47 | 03  | -25 | -24 | 07  | 11  | 26  | 10  | -19 | -10 | -25 | -33 | 01  | 10  | -22 | 05  |
| 48 | 27  | 19  | -07 | 05  | 04  | -06 | -07 | -06 | -02 | -25 | -19 | 09  | 08  | -06 | -09 |
| 49 | 66  | 06  | 02  | -00 | -16 | -07 | 05  | 01  | 04  | 02  | -02 | -08 | 01  | 08  | -11 |
| 50 | 03  | 19  | -19 | -21 | 05  | -09 | -10 | 01  | -27 | -12 | -21 | -19 | -31 | 21  | -08 |
| 51 | 73  | 05  | 02  | -03 | -07 | -07 | -00 | 08  | 07  | -10 | 16  | -05 | -05 | 04  | 02  |
| 52 | 49  | 13  | -17 | 05  | -10 | -01 | -09 | -06 | 06  | -01 | -02 | -19 | 10  | -08 | 05  |



|     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 53  | 04  | 09  | -05 | -07 | -15 | 03  | -16 | -16 | -26 | -03 | -02 | -10 | -07 | -13 | 05  |
| 54  | 51  | -04 | -05 | -01 | -17 | 08  | -02 | 01  | -02 | -09 | -08 | 02  | -00 | -09 | 01  |
| 55  | -04 | -36 | -21 | -06 | 05  | 26  | -08 | -41 | -25 | 18  | 03  | -07 | -01 | -28 | -06 |
| 56  | 58  | -02 | -07 | 00  | 05  | 03  | 08  | -01 | -05 | -01 | 01  | -02 | -18 | 06  | -20 |
| 57  | 33  | -07 | -39 | 32  | -02 | 05  | -28 | -07 | 07  | 37  | 07  | 05  | -55 | -07 | 22  |
| 58  | 32  | -13 | -21 | 04  | 05  | -05 | 03  | -01 | -18 | -19 | -01 | 10  | 14  | -12 | -09 |
| 59  | 09  | 11  | -41 | 25  | 00  | -38 | -21 | -05 | 20  | -05 | -08 | -22 | 03  | -15 | 08  |
| 60  | 26  | -02 | -24 | 14  | -06 | -27 | -09 | 08  | 02  | 02  | -25 | 04  | 07  | 10  | 04  |
| 61  | 68  | -05 | -18 | -10 | 09  | 16  | 21  | 08  | -21 | -03 | 03  | -02 | 11  | -02 | -05 |
| 62  | 10  | -08 | 17  | -08 | -06 | 15  | 33  | 22  | 14  | 05  | 27  | -05 | -07 | 07  | -12 |
| 63  | -01 | 19  | -32 | -10 | 13  | -16 | -03 | -00 | 18  | -07 | -02 | -04 | -02 | 18  | -01 |
| 64  | 20  | 03  | -05 | 11  | 07  | -10 | 24  | 19  | 03  | -16 | 09  | -04 | 07  | 03  | 08  |
| 65  | 26  | -01 | 24  | -05 | 09  | 15  | 11  | 08  | -06 | 30  | 18  | -14 | -06 | 37  | 06  |
| 66  | -03 | -09 | 42  | 09  | 05  | 08  | 30  | -32 | 07  | -05 | -02 | 27  | 09  | -19 | 12  |
| 67  | -16 | -14 | 07  | 08  | -07 | 24  | 09  | -45 | 03  | -07 | -00 | 25  | 10  | -12 | 07  |
| 68  | 05  | -08 | 50  | 07  | 23  | -29 | 16  | -22 | 09  | 03  | 07  | 06  | -04 | 03  | -02 |
| 69  | 19  | 04  | 03  | 01  | -24 | 16  | -03 | 05  | -06 | 07  | 22  | 27  | -04 | 27  | -45 |
| 70  | -07 | -03 | 10  | 03  | 03  | -09 | 02  | -07 | 10  | 07  | 16  | 39  | -02 | -04 | 12  |
| 71  | 10  | -05 | -24 | -20 | 25  | -19 | 07  | 00  | 15  | -02 | 01  | -16 | -06 | 10  | -21 |
| 72  | -04 | 01  | 07  | -34 | 26  | 37  | 06  | -24 | -21 | 00  | -10 | -03 | 07  | -07 | 10  |
| 73  | -04 | 09  | -17 | -43 | -04 | 57  | 10  | -00 | -20 | -10 | -03 | 02  | 04  | -02 | 02  |
| 74  | -15 | 23  | -29 | 00  | 05  | -11 | 14  | 04  | 17  | -38 | -11 | 08  | -08 | -42 | 03  |
| 75  | -04 | 08  | -08 | -05 | 27  | -22 | -22 | -06 | -13 | -11 | 01  | -16 | 05  | -21 | -01 |
| 76  | -09 | -05 | 13  | -04 | -12 | 24  | -04 | 00  | -02 | 25  | 03  | 02  | 16  | 03  | -20 |
| 77  | 11  | -03 | 07  | 29  | -40 | -03 | -04 | 31  | 09  | -10 | 15  | 08  | -52 | 05  | 34  |
| 78  | 06  | 07  | -42 | 01  | -02 | -02 | -03 | 27  | 00  | -10 | 18  | 02  | -06 | 22  | -39 |
| 79  | -32 | -06 | -04 | 05  | 37  | -05 | -52 | -20 | 10  | 29  | 12  | -04 | 02  | -04 | 20  |
| 80  | -27 | -10 | -08 | -08 | 58  | 09  | -15 | -03 | 02  | 15  | -04 | 03  | -20 | 06  | 12  |
| 81  | 40  | -19 | 27  | 46  | -14 | -10 | 01  | -05 | -01 | 05  | -07 | -22 | 06  | -07 | -14 |
| 82  | -08 | 15  | -05 | -07 | -07 | -02 | -09 | 65  | -00 | 01  | 01  | -03 | 20  | -05 | -32 |
| 83  | 03  | -04 | 08  | -26 | 22  | -10 | 00  | -10 | 16  | -05 | 11  | -05 | -02 | -11 | 09  |
| 84  | 16  | -03 | 04  | -09 | 16  | -06 | 17  | -27 | -50 | -10 | -04 | 00  | 23  | -50 | 53  |
| 85  | -15 | 08  | -07 | -03 | -10 | 04  | -02 | 68  | -09 | 07  | -02 | 06  | -00 | -11 | -08 |
| 86  | 07  | -01 | 29  | -03 | -22 | 03  | -12 | 07  | -54 | 12  | -20 | -25 | 34  | 17  | -14 |
| 87  | -09 | -10 | 24  | 34  | -20 | 08  | -14 | -04 | 10  | 01  | -16 | -08 | -23 | -01 | -04 |
| 88  | 03  | 25  | -14 | 02  | 09  | 07  | 36  | 01  | 21  | -06 | 71  | 08  | 51  | -33 | -31 |
| 89  | 13  | 09  | -01 | 24  | 10  | -06 | 06  | -09 | 18  | 24  | 53  | 01  | 02  | -05 | -23 |
| 90  | -07 | -10 | 09  | 05  | 52  | 04  | -08 | 08  | -14 | -03 | 45  | 08  | 10  | -09 | -10 |
| 91  | 04  | -07 | -05 | 10  | 28  | 49  | -23 | -11 | -22 | 01  | 09  | -09 | 07  | -34 | -01 |
| 92  | -02 | 21  | 02  | -05 | 02  | 05  | 01  | 24  | 21  | -05 | -03 | -20 | -07 | 47  | -02 |
| 93  | -00 | 13  | 09  | -10 | -00 | -27 | 05  | -43 | 00  | -01 | 24  | 40  | -09 | -08 | -03 |
| 94  | 03  | 04  | 25  | -05 | 19  | 59  | -08 | 01  | 06  | -01 | -17 | -31 | 10  | -05 | 07  |
| 95  | 07  | 01  | 03  | -05 | 08  | -06 | 04  | -06 | 66  | -06 | -29 | -13 | -32 | -05 | 20  |
| 96  | 07  | 00  | 04  | -06 | 06  | -09 | 04  | -04 | 64  | -07 | -32 | -10 | -31 | -01 | 19  |
| 97  | -31 | -24 | -05 | 01  | 32  | 10  | 25  | -06 | -08 | 06  | 27  | 15  | -04 | 04  | -28 |
| 98  | 03  | 08  | 02  | 03  | 24  | 59  | -30 | 11  | -14 | -05 | 05  | -24 | 02  | 07  | -01 |
| 99  | 31  | -06 | 21  | 31  | -08 | -03 | 16  | 51  | 11  | -02 | -01 | -10 | -01 | -00 | -35 |
| 100 | -31 | -03 | -02 | 05  | 03  | 08  | -18 | 46  | -05 | -03 | 01  | -23 | -11 | 24  | 02  |
| 101 | 01  | 24  | 08  | -26 | 07  | 03  | 06  | -00 | 08  | -38 | 03  | -10 | -10 | -29 | 64  |
| 102 | -06 | 19  | 35  | -01 | 37  | -02 | -26 | -04 | -07 | -07 | 09  | 19  | 34  | -01 | -07 |
| 103 | 30  | 01  | -05 | -10 | 02  | 27  | 21  | 10  | -30 | -08 | 08  | 20  | -08 | -30 | -10 |
| 104 | -06 | -42 | -02 | 05  | 03  | 05  | 05  | -11 | -11 | 48  | -13 | -02 | 08  | -27 | -01 |

## APPENDIX 2 D

### Interfactor Angles and Transformation Matrices.

|     |           |   |
|-----|-----------|---|
| I   | Session 1 |   |
| II  | "         | 2 |
| III | "         | 3 |

# TRANSFORMATION MATRIX, Session 1

Unrotated Factors (Transposed)

Rotated Factors

|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1  | 62  | -46 | -09 | 25  | -14 | 13  | 19  | -34 | 01  | -06 | -20 | -21 | 18  | -02 | -19 |
| 2  | 37  | 81  | -14 | -19 | -06 | 20  | -04 | -06 | -08 | -11 | 06  | 09  | -05 | 20  | 16  |
| 3  | -10 | 21  | -77 | 34  | -05 | 09  | 01  | -07 | 19  | 29  | 22  | -11 | 16  | 00  | -14 |
| 4  | -09 | -14 | -21 | -74 | -28 | 14  | -08 | -36 | 16  | 12  | -07 | -09 | 28  | -14 | 03  |
| 5  | 08  | -03 | -11 | -04 | 59  | -47 | 24  | 00  | 19  | -22 | -34 | -24 | -12 | 10  | -27 |
| 6  | -09 | 02  | 03  | -04 | 45  | 64  | -17 | 12  | 09  | -20 | -04 | -10 | -07 | -41 | -34 |
| 7  | 19  | -09 | -03 | -19 | -10 | 10  | 64  | 29  | 43  | 21  | -01 | 33  | 24  | -07 | -04 |
| 8  | 28  | -25 | -14 | 00  | 03  | -04 | -10 | 69  | -22 | -18 | -08 | -06 | -13 | 33  | -37 |
| 9  | 11  | -19 | -03 | 19  | 23  | -12 | -25 | -42 | 45  | 05  | 08  | 49  | -14 | 20  | 31  |
| 10 | 10  | -19 | 12  | -05 | 30  | -12 | -05 | -01 | -23 | 68  | 06  | -28 | 37  | -19 | 23  |
| 11 | 06  | -04 | 16  | -15 | -05 | 05  | 07  | -08 | -20 | -19 | 85  | -07 | -32 | -07 | -12 |
| 12 | 13  | -03 | -11 | -04 | -06 | 08  | -05 | 03  | -62 | -16 | 01  | 63  | 24  | -27 | -13 |
| 13 | -02 | -14 | -21 | 02  | 04  | 01  | 33  | -10 | -21 | 08  | -30 | -01 | -67 | -35 | 31  |
| 14 | 04  | -02 | 02  | 03  | -08 | -24 | -44 | 25  | 49  | -03 | 09  | 06  | -08 | -64 | -08 |
| 15 | -08 | 18  | 06  | -05 | 24  | -15 | 40  | -08 | -10 | -47 | 09  | -18 | 15  | -24 | 59  |

## INTERFACTOR (R V) ANGLES, Session 1.

Unrotated Factors

Rotated Factors

|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| 1  | -   |     |     |     |     |     |     |     |     |     |     |     |     |     |    |
| 2  | -20 | -   |     |     |     |     |     |     |     |     |     |     |     |     |    |
| 3  | 06  | 13  | -   |     |     |     |     |     |     |     |     |     |     |     |    |
| 4  | 08  | 02  | 04  | -   |     |     |     |     |     |     |     |     |     |     |    |
| 5  | 14  | -16 | -07 | -21 | -   |     |     |     |     |     |     |     |     |     |    |
| 6  | -02 | -04 | 00  | -01 | 08  | -   |     |     |     |     |     |     |     |     |    |
| 7  | 14  | -04 | 07  | 17  | 01  | -04 | -   |     |     |     |     |     |     |     |    |
| 8  | -02 | 04  | -20 | -33 | 05  | -18 | -01 | -   |     |     |     |     |     |     |    |
| 9  | 05  | -04 | 04  | -06 | 03  | -22 | -01 | -12 | -   |     |     |     |     |     |    |
| 10 | 09  | -26 | 04  | 17  | -05 | -19 | 00  | -01 | -09 | -   |     |     |     |     |    |
| 11 | -13 | 06  | -12 | -08 | -20 | -02 | -16 | -07 | -08 | -12 | -   |     |     |     |    |
| 12 | 04  | 10  | -12 | -01 | -32 | 07  | 02  | 07  | -11 | -05 | 07  | -   |     |     |    |
| 13 | 05  | -10 | -08 | -08 | 13  | 03  | -03 | 10  | 00  | -03 | -03 | 00  | -   |     |    |
| 14 | -16 | -21 | 04  | 03  | -02 | 22  | 03  | -11 | 14  | -04 | 03  | -03 | -06 | -   |    |
| 15 | -13 | 15  | -21 | -05 | 19  | -04 | 00  | 07  | -08 | 03  | 13  | -02 | 24  | -13 | -  |

# TRANSFORMATION MATRIX, Session 2. (Transposed)

|     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1.  | 13  | 89  | -11 | 03  | 27  | -12 | 16  | 11  | 04  | -09 | -02 | 04  | -09 | 05  | 10  | 07  | 13  |
| 2.  | 10  | 07  | 80  | -14 | 17  | -14 | 23  | 04  | -07 | 02  | 04  | 28  | 10  | -17 | 13  | -24 | 16  |
| 3.  | 06  | -02 | -01 | 87  | 01  | -31 | -01 | -05 | -19 | 02  | 24  | 00  | 09  | -01 | 12  | 02  | -14 |
| 4.  | 03  | -05 | -12 | -05 | 85  | 03  | 26  | 07  | 04  | -24 | 10  | -16 | 28  | 07  | 02  | -05 | -01 |
| 5.  | 16  | 02  | 02  | 00  | 05  | 72  | 30  | 32  | 22  | -06 | -18 | 09  | -19 | 19  | -16 | 08  | -25 |
| 6.  | 11  | -04 | -02 | -15 | -06 | -02 | 92  | -18 | 23  | -02 | -10 | 05  | 08  | 02  | -08 | -07 | 02  |
| 7.  | 30  | -03 | 05  | -11 | -19 | -30 | 08  | 67  | -13 | -23 | -21 | -15 | 06  | -21 | 33  | 06  | 13  |
| 8.  | 12  | -12 | 05  | 24  | -16 | -16 | -13 | 07  | 90  | -02 | -13 | -03 | -02 | -01 | -02 | 06  | -07 |
| 9.  | 02  | -21 | -02 | -01 | 27  | -08 | -11 | 17  | 00  | 87  | 09  | 14  | -06 | 17  | -07 | 03  | -12 |
| 10. | 21  | -09 | -14 | -03 | -11 | -02 | 13  | -08 | 25  | -05 | 76  | 14  | 36  | -01 | -01 | -31 | 08  |
| 11. | 14  | -02 | -21 | 04  | 10  | -06 | -12 | -03 | 18  | -20 | -01 | 86  | -20 | -15 | -16 | -01 | -07 |
| 12. | 15  | 08  | -07 | -21 | 05  | 09  | -06 | 03  | 07  | 32  | -14 | 07  | 84  | -15 | 09  | -07 | 19  |
| 13. | 13  | 00  | 02  | -13 | -14 | -11 | -06 | -07 | 04  | -16 | 07  | 13  | -08 | 92  | 05  | 00  | 14  |
| 14. | 42  | 04  | -38 | -26 | -01 | 25  | -12 | -13 | -03 | 36  | -17 | -30 | -31 | -08 | 27  | -14 | 26  |
| 15. | 23  | 16  | -05 | -11 | -03 | -12 | 01  | -08 | -23 | -13 | 16  | -42 | -15 | -22 | -26 | 69  | -06 |
| 16. | -10 | -11 | -12 | 00  | -18 | 30  | -12 | 00  | 00  | 16  | -15 | 11  | -05 | 08  | -67 | -39 | 40  |
| 17. | 20  | -21 | -06 | 02  | -07 | -17 | -06 | 07  | -14 | -09 | -07 | -16 | -06 | 07  | -20 | -20 | -20 |

## INTERFACTOR (RV) ANGLES. Session 2.

|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2  | 09  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3  | 02  | -06 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4  | 24  | 09  | -01 |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 5  | 05  | -11 | -32 | 11  |     |     |     |     |     |     |     |     |     |     |     |     |
| 6  | 09  | 18  | -19 | 21  | 28  |     |     |     |     |     |     |     |     |     |     |     |
| 7  | 13  | 18  | -07 | -04 | -06 | -02 |     |     |     |     |     |     |     |     |     |     |
| 8  | -10 | -12 | 07  | -15 | 12  | 08  | 04  |     |     |     |     |     |     |     |     |     |
| 9  | -18 | 00  | 06  | 00  | 01  | -15 | 2   | 00  |     |     |     |     |     |     |     |     |
| 10 | -09 | 09  | 15  | 15  | -16 | 22  | -14 | 13  | -03 |     |     |     |     |     |     |     |
| 11 | 08  | 04  | 00  | -07 | 12  | -06 | -13 | 17  | 00  | 13  |     |     |     |     |     |     |
| 12 | 01  | 16  | -18 | 18  | -14 | 07  | 11  | 01  | 18  | 27  | -13 |     |     |     |     |     |
| 13 | 06  | -05 | -09 | -04 | 10  | 13  | -09 | 02  | -02 | 12  | 01  |     |     |     |     |     |
| 14 | 09  | -28 | -33 | -11 | 06  | -05 | 08  | -11 | 19  | -17 | -17 | 12  | -05 |     |     |     |
| 15 | 17  | -26 | 02  | 01  | -08 | -07 | 14  | -17 | -10 | -20 | -24 | -23 | -18 | 07  |     |     |
| 16 | -24 | -14 | -28 | -24 | 18  | -01 | -14 | -14 | 11  | 04  | 14  | 08  | 05  | 13  | -29 |     |
| 17 | 05  | -14 | 15  | -03 | -14 | -04 | -03 | -03 | -03 | 01  | 01  | 08  | -05 | -10 | 05  | -07 |

# TRANSFORMATION MATRIX

Session 3.  
(Transposed)

Unrotated  
Factors

Rotated Factors

|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 11  | 12 | 13  | 14  | 15  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|
| 1  | -13 | 83  | 02  | 30  | -06 | -25 | -14 | 16  | -01 | 06  | 10 | 06  | -23 | 04  |
| 2  | 05  | 04  | 92  | -05 | -32 | 07  | 10  | 02  | -07 | 01  | 02 | -05 | 14  | -03 |
| 3  | 16  | -05 | -17 | 77  | 46  | -24 | -03 | 10  | 20  | -07 | 02 | -06 | -13 | 10  |
| 4  | -04 | -12 | 11  | -22 | 84  | -33 | -13 | 12  | -17 | -04 | 05 | 07  | 02  | -15 |
| 5  | 51  | 24  | -06 | -01 | 01  | 65  | 23  | 21  | 11  | 17  | 10 | -13 | -03 | -12 |
| 6  | 00  | -11 | -11 | -03 | 04  | -30 | 89  | 02  | 23  | 12  | 07 | 03  | -14 | -06 |
| 7  | -21 | -22 | -02 | 39  | -13 | -07 | 02  | 60  | 15  | -12 | 40 | 39  | 03  | 07  |
| 8  | -04 | -06 | 07  | -16 | 11  | -30 | -12 | 01  | 80  | -24 | 25 | -09 | -12 | 10  |
| 9  | -04 | -10 | 10  | -03 | 01  | -09 | -15 | -06 | -21 | -14 | 24 | -12 | 17  | -14 |
| 10 | 01  | -14 | -12 | -18 | 14  | -17 | -11 | -21 | -07 | 79  | 03 | -18 | -34 | -22 |
| 11 | 14  | 06  | -03 | 04  | -11 | 01  | -15 | -15 | -04 | 04  | 04 | 02  | -11 | -04 |
| 12 | 25  | 04  | 04  | 12  | -26 | -32 | -15 | 11  | -20 | -14 | 04 | 76  | 09  | 25  |
| 13 | 21  | 16  | -12 | 0   | -18 | -32 | 02  | 45  | 09  | 0   | 0  | -26 | 05  | 10  |
| 14 | -01 | -03 | 06  | -03 | -06 | -07 | -17 | -09 | 06  | 0   | 0  | 0   | -50 | 04  |

## INTERFACTOR (R V) ANGLES. Session 3.

Unrotated  
Factors

Rotated Factors

|    | 1   | 2   | 4   | 5   | 6   | 7  | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----|-----|-----|-----|-----|-----|----|---|---|----|----|----|----|----|
| 1  |     |     |     |     |     |    |   |   |    |    |    |    |    |
| 2  | -01 |     |     |     |     |    |   |   |    |    |    |    |    |
| 3  | 21  | -39 |     |     |     |    |   |   |    |    |    |    |    |
| 4  | -09 | -19 |     |     |     |    |   |   |    |    |    |    |    |
| 5  | -03 | 03  | -10 |     |     |    |   |   |    |    |    |    |    |
| 6  | -11 | -09 | 11  | 07  |     |    |   |   |    |    |    |    |    |
| 7  | 13  | -05 | 19  | -08 | 13  |    |   |   |    |    |    |    |    |
| 8  | 02  | -09 | 19  | -12 | 19  | 20 |   |   |    |    |    |    |    |
| 9  | -10 | 05  | -10 | 09  | -12 | 08 |   |   |    |    |    |    |    |
| 10 | -05 | -20 | -02 | -03 |     |    |   |   |    |    |    |    |    |
| 11 | 17  | -02 | 02  |     |     |    |   |   |    |    |    |    |    |
| 12 | 20  |     |     |     |     |    |   |   |    |    |    |    |    |
| 13 |     |     |     |     |     |    |   |   |    |    |    |    |    |
| 14 |     |     |     |     |     |    |   |   |    |    |    |    |    |

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